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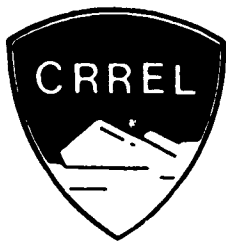
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The Temporary Environment Cold Regions Habitability

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THE TEMPORARY ENVIRONMENT Cold Regions Habitability

Robert B. Bechtel and C. Burgess Ledbetter

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Small installations had an advantage over large installations in the participation level of their populations in recreational and other activities. Family housing, transient housing, barracks and work environments of Fort Wainwright were studied. Habitability guidelines were suggested for minimal renovation, major renovation and new construction of these kinds of buildings. An overall plan for a more habitable location of post facilities was suggested. The behavior setting survey technique in shortened form proved useful in this study. Suggestions for future research in testing habitability guidelines were made.

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PREFACE

This report was prepared by C. Burgess Ledbetter, Research Architect, Construction Engineering Research Branch, Experimental Engineering Division, U.S. Army Cold Regions Research and Engineering Laboratory (USACRREL) and Dr. Robert B. Bechtel, President of the Environmental Research and Development Foundation, Kansas City, Missouri. C. Burgess Ledbetter, as the Project Officer, contracted with Robert Bechtel, a social scientist for the collaborative study.

This work was performed under Corps of Engineers DA Project 4A762719AT06, *Military Construction and Maintenance in Cold Regions*, Task 01, *Cold Regions Facilities Operations, Maintenance, and Engineering of Military Installations*, Work Unit 003, *Habitability Criteria for Military Installations in Cold Regions*. Contracted effort was performed under Contract DAAG-17-73-C-0104. Technical review of the manuscript was made by Dr. Robert Sommer, Chairman, Department of Psychology, University of California (Davis).

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SUMMARY

U.S. Army, Air Force and Federal Aviation Administration (FAA) installations in Alaska were classified into characteristic types. A representative installation from each type was studied using the behavior setting survey. The representative installations studied were one large Army post at Fairbanks, three small and remote Air Force Aircraft Control and Warning Stations (AC&W) and four small and remote FAA stations.

The most salient characteristic of the military environments was the temporary nature of the military employees and their dependents. They felt no long-term commitment to cold regions, which resulted in lifestyles that were considered quite undesirable. They made an unsuccessful attempt to imitate the life style they experienced in the temperate climates. They were not willing to meet the expense of adequate clothing and vehicles to withstand the rigors of the cold climate nor accept the way of life of those who enjoyed the Arctic and Subarctic. In contrast, the civilian FAA employees were volunteers to Alaska and successfully made the commitment to the cold regions way of life.

The small remote stations, both FAA and Air Force, offered a significant advantage over the large installation which was near a population center. This advantage was the greater number of leadership opportunities at the small site. A greater percentage of the population of the small sites were able to assume greater job responsibilities than their peers at the large installation. Furthermore, occupants of the small installations participated more in recreational and other activities than did the occupants of the large installations.

For richness, a measure of the desirability of the environment, the FAA stations scored highest and the AC&W stations scored lowest. However, the large Army installation would have scored lower than the AC&W stations, were it not for the family housing portion of the Army post.

Habitability guidelines were developed for minimal remodeling, major remodeling and new construction of the family housing, transient housing, barracks and work environments of the Army post. A prototype design was also developed for the remote AC&W station. Requirements for satisfactory habitability in each of the environments, with supporting data, and ways to achieve these requirements were presented in this report. The results of this research show that architectural design significantly influences user behavior. This influence is so significant in some instances, that immediate application of the habitability guidelines can improve environmental conditions now contributing to unsatisfactory home life, boredom, inefficient industrial operations, unsatisfactory customer service, limited use of recreational facilities and poor command leadership. In most cases, the habitability guidelines constitute no greater expense than the ineffective designs now being executed.

THE TEMPORARY ENVIRONMENT Cold Regions Habitability

by

Robert B. Bechtel and C. Burgess Ledbetter

PART I. INTRODUCTION: THE COLD REGIONS HABITABILITY PROJECT

PURPOSES AND OBJECTIVES

A study of the habitability criteria for the Cold Regions Military Installations project was begun in 1971 as a pilot study funded in-house at the U.S. Army Cold Regions Research and Engineering Laboratory (USACRREL) in Hanover, New Hampshire. In February 1973 USACRREL contracted with the Environmental Research and Development Foundation of Kansas City, Missouri, to conduct an "Environmental Psychology Study for Cold Regions" for selected Alaskan installations.

This report is organized as a narrative describing different aspects of the environments studied. Its course follows the logical sequence of the most general to the most specific aspects of each environment, which is parallel to the way behavior setting data are analyzed. The narrative is accompanied by drawings and photographs that: 1) illustrate present conditions and 2) suggest future design examples that would meet habitability requirements. The report will use the term habitability requirement to describe a fact about human behavior that needs some element of physical design to satisfy or complement it. Habitability guidelines are suggested solutions or partial solutions for design implementation.

Habitability requirements tell what behavioral conditions need to be met by future designs and what meeting these requirements which are closest to present capabilities of codes and budgets. Usually a minimal remodeling, a maximum remodeling, and a new construction design are suggested. Other solutions are possible and a creative architect could conceivably find better solutions. The derivation of habitability criteria must await a program of testing new designs in the field to determine which ones meet the new requirements.

The format of the report starts with a very broad (or global) assessment of behavior in the environments studied and then in succeeding sections proceeds to a much finer analysis. Analyses start with profile comparisons of action patterns and behavior mechanisms of the largest units, then move to the smaller units and finally to the work organizations, buildings and rooms. Part II of this report will deal with the global environmental aspects of Fort Wainwright, and Alaskan AC&W sites and FAA stations. Part III deals with Fort Wainwright's various sub-environments: family housing, transient housing, and the work environment.

In this report it is stated in several places that some Army regulations are not being carried out. Most of these are minor and not related to the basic mission. However, some, particularly the concept of Fort Wainwright as a *temporary environment*, may be implied to be critical of policies used in carrying out the mission of the U.S. Army in Alaska. One can read these statements and react

with the posture that regulations *must* be enforced and that deviations are antithetical to military purposes, but it is the view of the researchers that such a view is not only incorrect but self-defeating. In fact, it seems clear from the months of observing life at U.S. Army, Air Force, and FAA locations, that laxation of certain rules and the bending of certain policies are what make the mission possible. The data suggest that the American soldier or government worker, at least in Alaska, has an ability to overcome many obstacles of the environment and social life, and that a flexible attitude toward regulations, especially those concerning living conditions, fosters this survival factor.

In any case, the data here are presented as scientific facts with the purpose of deriving habitability requirements. In the course of presenting these data it may appear that some regulations and policies are not compatible with these criteria. Whether the regulation changes, or whether the behavior is made to change, is often a value decision that is beyond the scope of this report.

The facts derived are supported by questionnaire responses or observations, or both. No intention is made that these results are the "last word" on the subject. In some cases it is frankly admitted that more research is needed. The reader must make his own judgments about the merits of the evidence presented.

The use of the behavior setting survey

The methods and procedures of the behavior setting survey are documented in the next section of this report. Definitions of the behavior setting and other terms are found in the Glossary. The methods of a behavior setting survey require a complicated set of instructions involving the use of observation, rating scales, informants, recorded data, and questionnaires. The question arises as to why this method should be used in place of more traditional ones, such as ordinary questionnaires, semantic differentials, or attitude scales. The reasons are two: the range of information and the kind of data collected.

Range of information. Table I illustrates the behavior setting survey methods in contrast to other methods in terms of range of information covered by various units of study. The largest unit of study in gathering behavioral information is a culture. Cultures have traditionally been the province of anthropology, and while Table I does not show behavior setting surveys as covering cultures, they have been used for cross-cultural comparisons (Barker and Barker 1961a).

**Table I. Range of coverage for behavior setting survey
versus other methods.**

<i>Behavioral units</i>	<i>Behavior setting survey</i>	<i>Other methods</i>
Culture	Not covered	Anthropology
Community and above	Covered	Sociology, anthropology, economics, community psychology
Neighborhoods	Covered	Sociology, anthropology, community psychology
Organizations	Covered	Sociology, social psychology, economics, management sciences
Authority systems	Covered	Not covered
Genotypes	Covered	Not covered
Behavior settings	Covered	Not covered
Cyto settings	Covered	Human engineering, proxemics
Synonymorphs	Covered	Human engineering, proxemics
Individuals	Not covered	Personality, clinical psychology
Actones	Covered	Methods-time measurement, kinesics

From Table I it can be seen that the range of information covered by a behavior setting survey includes several areas not covered by other methods. In other words, even by using the most strategic combination of other methods, several critical units of behavior, especially the behavior setting itself, would be missed.

Coverage of the behavior setting is critical because this is the unit of human behavior that is the natural, ecological unit most closely unifying behavior and environment. The behavioral setting unit is, in fact, *the unit of behavioral use of the immediate environment*,* and the behavioral and environmental aspects are so closely intertwined that they are inseparable.

It must not be overlooked that the behavior setting survey covers the more global aspects of behavior that permit characterizing an environment as a whole, as well as providing data on each setting. Thus, by use of behavior setting data it was possible to characterize the environment of the elderly as *regressed* (Barker and Barker 1961b), to characterize the public housing environment as fostering *dependency* (Bechtel 1971) and to designate certain urban residential areas as *passive* (Bechtel, Achelpohl and Binding 1970).

Therefore, the behavior setting survey, more than any other method or combination of methods, provides the most comprehensive range for measuring a total environment, since it is first necessary to measure environments in order to make comparisions from which habitability requirements are then derived.

Quality of information. It was Barker (1968) who stated that observational methods are the ones most likely to obtain information about behavior-environment relationships. Other methods attempt to gain information about what goes on inside the person, while observation uses what the person *does* rather than what he *says*. This is an advantage in learning about the use of the environment, because many people use the environment so unconsciously that they cannot tell others how they use it. Therefore, the quality of observational data is more environment-specific.

A behavior setting is a natural unit involving behavior with physical aspects of the environment. When an organization is built it naturally divides itself into units in order to operate. These performance units are the behavior settings, and by understanding them, one can understand the natural functioning of any organization, community, or other human enterprise. The advantage of having a natural unit is that people recognize and treat behavior settings as units without having to learn the researcher's definitions.

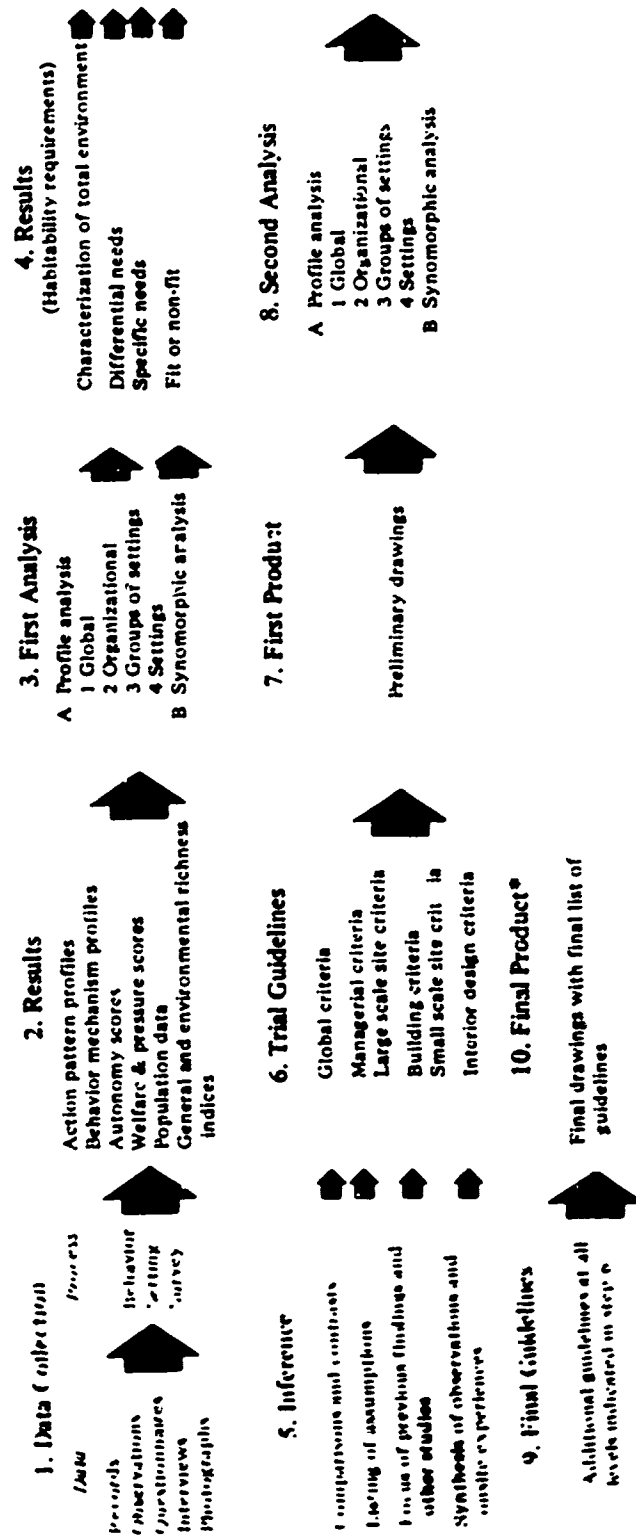
Methodological lessons learned. Given the time and financial parameters of this study there was no way that the behavior setting survey could be done according to Barker's (1968) specifications. A shortened form, requiring only a few weeks, was necessary in order to get the job done. A shortened form was used in the Kansas City residential study (Bechtel, Achelpohl and Binding 1970) and the ARROWHEAD study (Bechtel 1972). Essentially, a shortened form makes an increased use of informants to get data for the whole year, and/or extrapolates data from a shorter period of observation.

At the study site (Fort Wainwright) it was possible to recruit and train officers' and enlisted men's wives to do the shortened form of the survey. Periodic checks for accuracy were necessary.

At the AC&W (Aircraft Control and Warning) stations and at FAA (Federal Aviation Agency) sites, the shortened form of the survey was given to cover a total year's activities (fiscal 1974), and at most of the Fort Wainwright organizations total coverage through use of the shortened form was achieved. But in the case of family housing and barracks, a sample survey using a questionnaire was made to determine whether this was a satisfactory way to conduct a behavior setting survey. It should be noted that a questionnaire could not be constructed unless the researchers had already accumulated a backing of knowledge about the environments to be measured. In other words, such a questionnaire could not be attempted without a fairly long period of previous acquaintance with the environment (one of the authors, C.B. Ledbetter, had been living on site 10 months prior to the questionnaire).

*See Barker (1968) *Ecological Psychology*, p. 172 for definition of immediate environment.

Table II. Process of deriving habitability guidelines.



*The final product is a final product for purposes of this report only. Actually the design recommendations need to be implemented by actual construction after which this process will be performed again to evaluate the efficacy of the guidelines.

It was learned that some of the men in barracks could do a credible job of accounting for their time without prompting from an interviewer, but that a significant number (50%) could not satisfactorily answer such questions without being prompted.

The experience from the family housing questionnaire was those interviewed best account for their time by prompting from the interviewer, asking for specific activities over the course of a year. Military people probably have a better sense of when events take place than civilians because of the pressures of their work to constantly attend to schedules and plans.

A deliberately small sample of family housing was made ($N = 40$) to demonstrate the high reliability and validity of behavior setting data. In Appendix B the data are compared with a deliberately biased sample of senior occupants ($N = 27$) and the observer's own data. The close similarity of results should demonstrate the usefulness of the small sample.

Barker (1968) does not formalize environmental analysis below the level of the behavior setting. He does specify smaller units such as cytosettings, synomorphs, and actones (see Glossary), but it is not specified how these can be organized for study beyond noting their natural landscape (see Barker 1968, p. 24, for diagrams of synomorphic arrangements).

The study reported here attempted to arrange synomorphs by the use of K-21 Scales (see Glossary) but did not arrive at a final state of presentation for this report. Future research is necessary to determine the matrix arrangement of synomorphs and the format for presenting results. Most synomorphic results in this report are given under the term "observations."

The shortened form of the behavior-setting survey and the two random sample questionnaires proved useful in doing a behavior setting survey of remote sites and Fort Wainwright. As this report shall demonstrate, the behavior setting data are useful in defining man-environment problems that need to be resolved by better operations and design (see Table II).

Problems encountered

All requirements and objectives of the study have been met. However, certain compromises had to be made, based on availability of recorded data and ability to visit selected sites within the time frame of the contract.

Out of the complete range of data requested, remote stations did not have information available on certain statistics (such as suicides). Certain kinds of illnesses or other variable data had to be dropped from initial analyses.

Further, as one site selected for the behavior-setting survey (Fort Wainwright) could not be completely surveyed because of its large size, significant elements of the post were selected to provide essential data. Family housing, transient housing, the barracks and certain work environments were chosen as the most important aspects of cold regions habitability from which to derive criteria.

The sites finally chosen for study were: one Army sub-base (Fort Wainwright), three AC&W stations of the Air Force (Kotzebue on the west coast of Alaska, Campion, near the town of Galena, and Murphy Dome, 20 miles from Fairbanks), and two FAA locations (Cordova, on the south coast of Alaska, and Gulkana in the central region). These sites correspond to the types outlined in the Phase I report, with the exception of Campion which had to be substituted for Indian Mountain because high winds prevented landing there. (See Fig. 1 for locations of sites.)

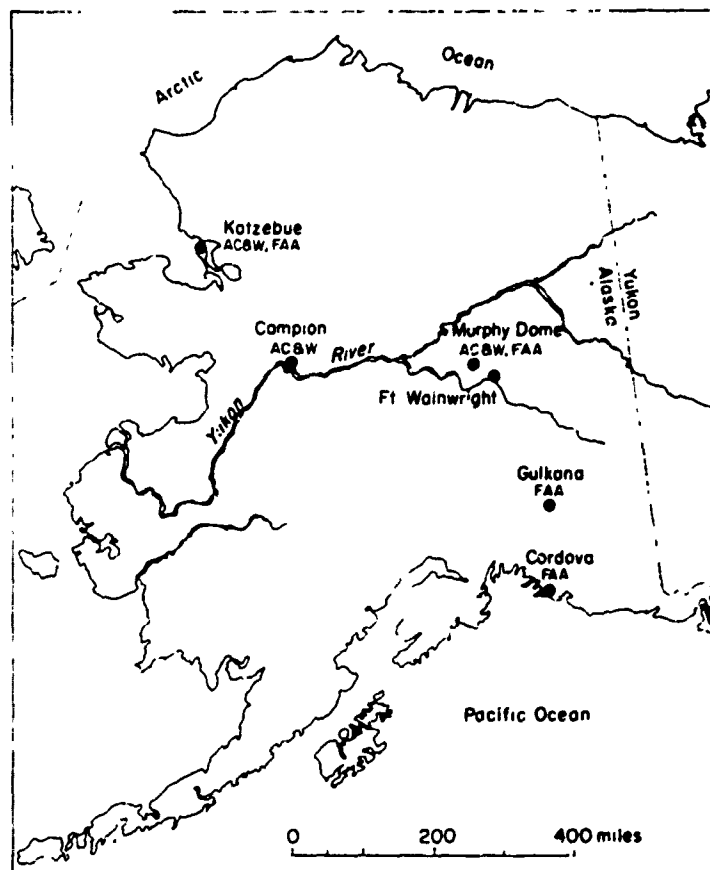


Figure 1. Study sites in Alaska.

DEVELOPMENTAL BACKGROUND OF ENVIRONMENTAL PSYCHOLOGY

The history of behavior setting methodology is over 25 years old. In 1947, two psychologists, Roger Barker and Herbert Wright, moved from the University of Kansas in Lawrence to a small town about 20 miles to the northeast – code named Midwest. Both had been pupils of the social psychologist, Kurt Lewin, and both were determined to search out the structure of behavior in a total human environment. At that time, Midwest had a population of about 700, ideal for their purposes, because Barker and Wright wanted to be able to study the process of children maturing in the context of a total community that was small enough for them to observe. At the town site, they set up the Midwest Psychological Field Station as a base of operations from which to observe the residents. As time went on, the psychologists and their staff became a part of the community.

Behavior specimen records

The first efforts of Barker and Wright were published in the book *One Boy's Day* (1951). This book detailed the complete behavior record of one 8-year-old boy from the time he got up in the morning until he went to bed at night. The technique that evolved from this study became known as the collection of *behavior specimen records*. Barker and Wright eventually accumulated 18 such records for the use of social scientists. This was the first archive of complete daily behavior records of children and remains the sole archive of such material up to the present.*

*Other researchers, however (Schoggen and Schoggen 1971), using the specimen record technique, have catalogued behavior of children over periods of time less than a total day.

The specimen record technique was developed largely by Herbert Wright. A description of this method is contained in the first chapters of *Midwest and Its Children* by Barker and Wright (1955) and is reprinted in Wright's book, *Recording and Analyzing Child Behavior* (1967). This technique consists of having a team of observers record the total behavior of an individual by writing down all that occurs during a specified time period. So intensive is this experience that observers can last only about twenty minutes at a time; hence the need for a team if any length of time is involved.

The recordings are composed largely of common sense observations, and they involve the most ordinary observations about what the person being observed is doing. For example, Table III gives a description of specimen records of four persons in a family watching television.

Each behavior specimen can be divided into discrete units called behavior episodes (Barker and Wright 1955, p. 4-6).

The behavior specimen record can have great utility if one wants to show detailed use of a given environment by individuals. Unfortunately, unless specific aspects of the environment need to be intensely studied, the behavior specimen technique is too time-consuming to be of general use.† The best application of this technique is in gaining insight into detailed use of a behavior object such as a vending machine, television, couch, or some other object. Its use, for the evaluation of an entire house or office building for instance, would be too time-consuming in both observations and analysis of data.

Table III. Two minutes of family viewing.*

Time	Tommy	Jamie	Mother	Father
28'	He is watching TV with close attention.	Out	Out	He turns his head to ask a question. He moves the newspaper and looks back at it.
28'30"	Rests his hand on his leg. He wipes his nose with his arm and looks at his brother and father.	Returns and sits on couch. He sits all the way back with his feet stretched straight out	Enters living room carrying an article of clothing on a hanger. She glances at TV.	Looks up as Mrs. Barker passes through. (At the same time TV says, "Hey look over there.") He watches TV set for ten seconds, then turns back to newspaper. He looks up at set again. (There is marching music on TV.)
29'	Says something to Jamie and something to his father. He leaves the room after looking at them.	Watches TV intently. Answers his father's question and looks at him for a few seconds.	Carries article of clothing on hanger into another room.	Takes his hand off his head and looks at the boys. He asks something about what is on television. He then moves his legs slightly.
29'30"	Returns and sits on couch. He places one leg out and tucks the other underneath him. Wiggles his foot a little.	Flutters his feet as a swimmer does and then stops. Still watching TV.	Returns to the living room, stands in the doorway and pays no attention to TV. She seems to be clearing something from the table.	He holds the newspaper up; hard to tell if he is looking at it or at the television set.

* Taken from p. 89 of the report of the Surgeon General's Scientific Advisory Committee on Television and Social Behavior, titled *Television and Growing Up: The Impact of Televised Violence*, which was borrowed from R. Bechtel, C. Achelpohl and R. Akers, correlates between observed behavior and questionnaire responses on television viewing in *Television and Social Behavior*, vol. 4: *Television in Day-to-Day Life: Patterns of Use* (I. A. Rubinstein, G. A. Comstock and J. P. Murray, Eds.). Washington, Government Printing Office, 1971. This specimen record differs from those collected by Barker and Wright in that it was recorded on video tape, thus permitting the observer to go back over parts he missed, and to "stop" the behavior when he got tired.

† For example, the 119 children of Oskaloosa engaged in about 100,000 episodes of behavior each day, or over 36 million a year (Barker and Wright 1955, p. 7).

An ecological perspective

Long before the term "ecology" had become popular, Barker and Wright had described their work as psychological ecology. This was later changed to ecological psychology in the 1968 book.

Soon after moving to Midwest, it became apparent to Barker and Wright that the methods of psychological investigation used up to that time were not only inappropriate but in many cases misleading. The cornerstone of all psychological investigation had been then, and still is, the psychological experiment. Barker had been especially skilled at setting up such experiments to discover factors in children's behavior. One of his most famous experiments was a demonstration that children, when frustrated, regress in their behavior. That is, when confronted with a frustrating experience, their level of behavior regresses from a normal maturity level to one below a level they are capable of reaching (Barker, Dembo and Levine 1941). In short, the child *acts* younger.

The problem with this conclusion was that it showed no evidence of reality in the ecological environment. Barker observed that children in the natural environment were not frustrated in the same way as in his laboratory experiment, and even when frustrations did occur, the children did not regress in the way they seemed to in the experiment. In short, there must be ecological validity to any conclusion about human behavior - it must be shown to occur in the natural setting.

From this perspective, Barker eventually evolved the notion of the naturally occurring unit of human behavior, the behavior setting.

Behavior settings

Barker (Barker and Wright 1955, Barker 1968) has defined the behavior setting as... "a standing pattern of behavior and a part of the milieu which are synomorphic and in which the milieu is circumjacent to the behavior." (Barker and Wright 1955, p. 45). In simpler terms: a behavior setting is a standing pattern of behavior that occurs over and over again, tied to a given place and given time. You can go to the *place* where it occurs at the *time* it occurs and see the behavior repeated each time the setting happens (see behavior setting form in Fig. 2).

Social Area: _____ hour _____ date _____

Residents of Carver Park

	Males	Females
Infants (under 2)		
Preschool (2-5:11)		
Preteen (6-11:11)		
Teen (12-17:11)		
Adults (18-64:11)		
Elderly (65 and over)		

Non-Residents

	Males	Females
Infants		
Preschool		
Preteen		
Teen		
Adults		
Elderly		

Description of behavior: _____

Figure 2. Form for observation of behavior and social areas - ARROWHEAD.

Yet behavior settings, even though they are defined as separate entities, are a part of the flow of behavior in a community. People move in and out of settings but the settings do not disappear when different people arrive -- they have a life of their own. Yet, when the community changes, settings change also.

While most persons can easily identify settings, there comes a time when the observer is confronted with the need to determine when two behavior patterns are two settings or only one. It is then that the highly technical aspects of the behavior setting come forth to enable such a determination.

Barker (1968) defines the behavior setting as having seven measurable dimensions. These include: 1) people who enter into both settings, 2) leaders common to both settings, 3) space common to both settings, 4) objects common to both settings, 5) behavior in one setting influenced by behavior in the other setting, 6) time common to both settings, and 7) behavior common to both settings. The K-21 scale, an arbitrary measure of whether two behavior patterns are separate settings, is shown in the Glossary. This scale may seem complicated on first contact, but generally, when overlap in each of the areas is below 50%, the settings are separate and get a score of 21.

Thus, with this scale to measure the separateness of settings, Barker and Wright were able to count 2,030 behavior settings in their small town during the year that lasted from 1 July 1951 to 30 June 1952. This encompassed an enormous amount of behavior, virtually accounting for an estimated 95% of the behavior of all persons in the community (Barker and Wright 1955, p. 10).

The behavior setting survey

Behavior settings as discrete units of behavior are easily recognized. They are the football games, the grocery stores, the church services, the streets and sidewalks, etc. that catalog all of the behavior that takes place in a community. Yet, the settings are not scattered about like stones thrown at random; they have definite relationships to one another, to the physical environment, and to the social structure in a community. The systematic way to collect data on behavior settings and their relationships is known simply as the behavior setting survey. This is not a survey in the ordinary sense of interviewing persons to determine some facts about them -- this is a survey of *behavior*.

A behavior setting survey is begun in what may seem a most unscientific, even gossipy, manner. Newspapers, high school yearbooks, telephone directories, and other public media are scanned to make a preliminary list of settings. Naturally each telephone number indicates at least one setting. Newspapers give announcements of meetings, weddings, funerals, demonstrations, sales, and sports events. These are all settings. High school yearbooks list the extracurricular events, the classes, the sports schedules, and special events. These are also settings.

But much of the behavior that goes on in a community is not reported publicly, and for this reason field workers and informants are necessary. The field workers go into the community to observe settings, and informants relate many settings that the field workers might miss. When all these sources of information are culled, a final setting list can be made.

Generally a setting survey requires one year. The 12-month period is necessary because many settings such as holidays and seasonal celebrations occur only once per year. However, for many specialized purposes, setting surveys can be done for much shorter periods of time (Bechtel, Binding and Achelpohl 1970, Bechtel 1971).

Concurrent with the gathering of settings are the various scales used to quantify behavior within and across settings. These scales provide no less than 63 separate bits of information about each setting. Let it suffice here to say that the collection of data for the scales is accomplished by having researchers observe and measure behavior whenever possible. Informants are also a valuable source for the scales.

When completed, the behavior setting survey data are the raw material around which the designer can give form to his structures. The survey can be tapped for information about a room, a building, streets and sidewalks, or any aspect of the community in part or in whole. The behavior setting survey is a complete catalogue of behavior indexed to locations, times, frequencies, populations, age groups, intensities, and a complex of other details. Its use is not easy to master, but it provides the only known comprehensive way to master design elements of behavior.

Behavior and environment

One of the most pervasive questions posed to the practitioners of ecological psychology is the question of just how the environment influences behavior. The anthropologist Birdsell (1970) posits an ecological model for primitive groups that forces a direct relationship between the amount of food available and the composition of a hunting-gathering band in Australia. But most human habitations are far from this direct relationship between man and the environment. A whole host of physical structures, social systems, roles, and other paraphernalia of society stand between the direct effects of nature and the urban or rural citizen of the United States, so that these elements operate on the individual to influence behavior and become part of the ecological input operating on persons within settings.

Barker (1968, p. 147) states that, at first, he expected to be able to successfully predict behavioral outputs once he had correctly ascribed the ecological inputs. It did not work out however; of all inputs from the social environment, only about one-half were found to elicit predictable behavior episodes (Barker 1968, p. 149).

Even more discouraging for design enthusiasts who believe that design can significantly influence behavior,* Barker conceded "...that the nonsocial, ecological environment does not demand behavior, that it enters psychology only as permissive, supportive, or resistive circumstances..." (Barker 1968, p. 150). Predictions of behavior from the nonsocial environment were assumed to be much lower than those from the social environment.

It is assumed in Barker's theories that the most predictable influence on behavior exerts itself via the behavior setting. Each setting has its own schedule of behavior, and the complete schedule is usually kept in the heads of the people who lead the settings: the shopkeepers, teachers, policemen, and others who direct or help direct behavior. The schedule of behavior can be thought to contain two types of what Barker calls "circuits" to maintain behavior in the setting and, hence, the integrity of the setting. These are *deviation-countering* circuits and *vetoing circuits*. The deviation countering circuits generally force people to correct things or change behavior when some deviation from the normal behavior is perceived - when the clock stops, when a window is broken, when a student makes an error on a test, when a car goes up a one-way street the wrong way.

Vetoing circuits are a little stronger than deviation-countering circuits in the force they exert on the behavior. They do not redirect the behavior; they eliminate the one who misbehaves from the setting itself - the clerk stealing from the cash register is fired; the broken radiator is replaced; the student who fails all his courses has to leave college. Generally, the vetoing circuit operates when the entire setting program is threatened.

This brief discussion, of course, does not do justice to Barker's intentions, and the reader is again referred to Barker's book for greater detail. The important features to keep in mind, however, are that each setting has resources, both social and nonsocial, to preserve the integrity of its

* See, for example, David Dempsey's article in the May 1972 issue of *Playboy* which alludes to a remark attributed to Richard Neutra that he could design a house that would guarantee a divorce for any couple who lived in it a month.

behavior programs by either directing deviations to be corrected or expelling those who threaten it. The deviation-countering or the vetoing can be done by social or nonsocial means.

Design and the behavior setting survey

Overwhelming questions remain for the designer, planner, or researcher when confronted with the need for data about human behavior: "Why do a behavior setting survey?" "Aren't there many easier ways to do such research?" For example, the set of questionnaires recommended by Sommer (1972) could evaluate a building environment. Moos' questionnaire (1972) could be used for institutional environments. Chapin's (1969) time activity systems could serve for more general environments, and more to the point, Alexander's (Alexander et al. 1965) pattern sequences might be used as basis for constructing an environment. Certainly all of these techniques have their merits, not the least of which is that they are easier to do and better known than the behavior setting survey.

Nevertheless, there are two principal reasons why the behavior setting survey is especially suited to answer questions about the relationship between behavior and the physical environment. The first reason is that the observable events of behavior are those most easily influenced by the physical environment (Barker 1968). Consider that the unobserved events, the feelings, attitudes, and other internal processes generally give way to the environmental pressures of the setting. The chairman may not feel well, but he will preside over the meeting because he is chairman; the driver may be young and capricious but he stops at nearly every stop sign because the setting demands it. In short, the observable elements of behavior are those most closely linked to the physical environment.

Yet, in contrast to this principle, most of the research on the relationship of behavior to environment has been done on the *nonobservable* aspects of human behavior.

The second reason why behavior setting surveys are so well suited to measuring the effects of the physical environment lies in what Barker (1968, p. 140) calls the researcher as *operator* vs the researcher as *transducer*. When the researcher is an operator on the scene, he imposes his own view on the data in both a selective and a confining way. As an operator he has a specific question in mind and he selects only the data that he thinks are related to that question. Preferably he will take a very limited portion of the environment and subject it to highly controlled variables. In short, the operator manipulates the environment in such a way that either it is not the same as it was before he came on the scene, or he obtains a segment of it that is not representative of the whole.

The transducer, on the other hand, makes every effort to study the data as they exist without his presumptions. He is merely a transmitter or coder, not a manipulator. For this reason, questionnaires, experiments, interviews, and similar methods are manipulators of the environment. They reflect only a limited funneling of data from the natural environment as it exists.

The researcher as transducer is a universe away from the research methods most commonly in use today. The transducer attempts to receive and organize *all* behavior and not just his preconceived categories. The consequences of this view are rather profound. If a researcher attempts to be merely a transducer, he flies in the face of most of the accepted ways of doing research that are known today. He may have hypotheses and preconceptions but he tries to measure virtually *everything* in molecular behavior. Nothing could be more disturbing to the academic behavioral scientist. The very foundation of behavioral science is the hypothesis-testing reductionism copied from the physical sciences (Mars 1964), and the thought of the researcher as transducer is, at first glance, an anathema to such thinking.

There is no reason, however, for such a reaction to the behavior setting survey. Conducting a behavior setting survey does not necessarily imply that the researcher does not have hypotheses or specific interest in certain parts of the data. The survey merely guarantees that as nearly as possible the whole environment will be measured so that the researcher, admitting his fallibility, will not lose essential elements that might bear on the influence of environment on behavior. This is especially important for designers and planners who are not generally as astute at generating hypotheses as behavioral scientists and who are really interested in the effect of the physical environment on the whole of behavior. The behavior setting survey is adaptable to any kind of environment without imposing the assumptions of a questionnaire or other instrument, and it is comprehensive enough to catch the many diverse elements that even the most careful researcher might have missed. In short, with the state-of-the-art in environmental psychology being what it is, the behavior setting survey is the best way of making sure that all contingencies are provided for. The illustrations that form the bulk of this report, it is hoped, will demonstrate the greater wisdom of that approach.

PROCEDURE: BEHAVIOR SETTING METHODOLOGY AND RATING SCALES

To speak of behavior settings, for all practical purposes, is to speak of the universe of human behavior. The chaos suggested by the whole range of human behavior is put into order by the process of a behavior setting survey. But even this ordering of human behavior into neat categories does not always provide a way out of the chaos unless there is a purpose of doing the survey. Surveys can be done for many reasons: to understand the full range of small community life (Barker and Wright 1955), to measure differences in urban residential environments (Bechtel, Achelpohl and Binding 1971), to measure social change in a 10-year interval (Barker and Schoggen 1973), to measure and understand differences in school behavior (Barker and Gump 1964), and to measure and evaluate planned change in a public housing project (Bechtel 1972). These are some of the purposes for conducting behavior setting surveys, but by no means do they even begin to exhaust the possibilities.

Generally then, in deciding the purpose of a survey, one must focus on what environment he needs to study and what answers the behavior setting survey will be likely to give him. As is often the case, the survey may need to be combined with some other technique, such as collecting specimen records or administering some form of psychological test. For design purposes the researcher may want to focus on whether certain design features will influence settings. A planner may want to determine the influence of a park on a neighborhood or a highway engineer may want to know the effect of a thruway on an urban community. Once the purpose has been selected, then the survey can be directed to answer the question involved.

In the same way that a behavior setting survey can be unfocused because of a lack of central purpose, the learning of behavior setting surveys only academically can produce confusion in a novice observer. The best way to learn behavior setting survey techniques is by doing a survey from the beginning.

The first step in a behavior setting survey is to select a well-defined area such as a building or a hotel lobby, and to record the behavior on a behavior setting form (Fig. 2). Only then will the many scales and measures become meaningfully connected to observable human behavior.

Two lessons can be learned from such an enterprise. The first lesson is that the behavior setting survey can be directed toward specific design questions of user behavior. In many cases more effort will be needed to elicit the questions than to collect the data, for the novice observer will quickly learn that many designers have no specific purposes for many design features.

The second lesson is that careful attention to and reflection on all of the aspects the designer and observer ever considered will not produce the near comprehensiveness in results of a behavior setting survey. The features of daily behavior are too varied and adaptable for the ordinary designer or researcher to include all of the possible responses in his search for answers. Therefore, the behavior setting survey will prove to be valuable for the formulation of further design problems and the evaluation of unexpected effects.

In many cases, however, the behavior setting survey itself will not answer essential questions about a particular environment unless it is compared with previous surveys. For example, in project ARROWHEAD (Bechtel 1972b) it was discovered, as a result of a behavior setting survey, that residents in the public housing project had extremely low autonomy* in their public affairs. This low score on the autonomy scale was of little meaning until it was compared with similar scores in different environments like those of the small town (Barker 1968) and other urban environments (Bechtel, Binding and Achelpohl 1971). Then it was evident that the autonomy level was indeed relatively very low (Bechtel 1972b).

It is important to keep in mind then that one setting survey by itself does not always contain the full amount of information needed for certain decisions. A designer may ask, "Have I designed this neighborhood like a small community?" His success can only be measured by data from a small community compared to data from his own constructed design.

Sources of behavior setting survey data

All published media about the area being studied must be utilized as sources for a behavior setting survey. Telephone books, for instance, are a useful resource since virtually every public enterprise is listed in the telephone book. City directories, registers and lists of organizations are also essential. The public media usually provide enough information to set up a tentative list of behavior settings. The tentative list is always made overinclusive at first to ensure that potential settings are not missed.

The principal source of data, however, is usually the researcher and his hired observers. The hired observer is the one who must collect the observed data on occupancy and attendance figures. Hired observers are usually local residents who have wide acquaintance with the neighborhood. More often than not the ideal observer is a middle-aged woman with teen-aged children (who can also be utilized as informants). Care must be taken not to hire the "neighborhood gossip" as she will be a person most others will want to avoid.

Essential to any behavior setting survey are the reliable services of informants. Even when the researcher can live in the environment he is studying, it is not possible to cover all settings without the help of at least several knowledgeable informants. Informants are also useful in helping to establish the validity of the various measurement scales used in the behavior setting survey. It must be noted carefully, however, that informants can often be wrong about quantities of human behavior and the researcher needs to be ever-vigilant to discrepancies between observed and reported data.

Regardless of the size or character of the area being studied, an accurate census is a prerequisite of a behavior setting survey. (The U.S. Census is not adequate except perhaps where one is attempting to do an entire city.†) The census compiled by the researchers serves as a check on the behavior setting survey, which should roughly account for the waking hours of every person in the census.** Large gaps in time missed by the survey will then be obvious. Further, the census provides the number of occupants for home settings which are usually not measured in a behavior setting survey.

*Autonomy is defined by Barker (1968, p. 76) as the degree to which four decisions are made by the residents of a local area: 1) appointment of performers, 2) admittance of members, 3) determination of fees and prices, and 4) establishment of programs and schedules.

† No behavior setting survey has ever been attempted for a city. The job would be too enormous. Instead, some form of sampling procedure needs to be worked out.

**Barker and Wright (1955, p. 10) claim that 95% of public behavior is covered in a behavior setting survey that is done for a 12-month period.

Home or family settings are usually not measured for several reasons. The cost of a survey would be doubled, and there is a question of invasion of privacy in measuring home settings, so that permission must be gained to each home. Also, unless one wants to know specific details about how the houses are lived in, the public settings outside the home usually provide all of the information needed on behavior in the environment. If behavior inside the homes really must be known, a representative sample will do just as well.

In summary then, the behavior setting survey is organized around its purpose and begun by a collection of all public media. The researcher hires local residents as observers,* and establishes a network of informants.

Time period

The classic behavior setting survey established by Barker (1965) and his colleagues lasts for one full year. There are many good reasons why a year is a minimal time in which to conduct a behavior setting survey. The most obvious is that many settings such as holidays only occur once a year. Also many settings such as sports events, occur on a seasonal basis. Furthermore, a year permits the researcher the time required to get to know the peculiarities of the settings, and to check on the reliability and validity of observations.

Nevertheless, for certain purposes it is possible to conduct a behavior setting survey for a shorter period of time, such as only six weeks (Bechtel, Achelpohl and Binding 1971, Bechtel 1972a and 1972b). While some data is lost in this procedure, it is not always necessary to know about all settings, and usually the most common ones can be uncovered on a six-week basis. Naturally, this involves a heavier use of informants (rather than hired observers) and it necessitates a more intensive effort for getting acquainted with the site and training the observers prior to beginning the survey. This "lead-in" time should be at least four weeks in length, and possibly as long as eight weeks. This time is used in getting acquainted with the site, selecting candidates for observers and informants, and training the observers to a high degree of reliability.

Observers need to be trained in the accurate observation of behavior. Very few persons ever consider the element of time when they notice the behavior of themselves or others. Fred Binding, co-author of the Bechtel, Achelpohl and Binding (1971) study provides a typical illustration of how little attention people give to the timing of events.

Binding was assigned to the observation of a choir rehearsal in the small town where Barker was doing his research. He asked various members of a church choir how much time they spent singing during the hour of practice. Guesses ranged between 30 and 40 min out of the hour. Binding took his stopwatch and carefully recorded the actual singing time of several sessions. The average was close to 8 min.

A stopwatch or a watch with a sweep second hand is essential to careful observation. With some practice, observers can give extremely reliable observations. A good strategy is to have two observers stationed in separate buildings watching an overlapping field of view. At first, the differences between their observations will serve to demonstrate how different the same behavior can appear without close observation. Experience has shown that observers will become competitive about their accuracy.

Another aspect of observation that needs training is the recognition of age groups. Usually six categories of ages are used: infants (under 2 years), preschool (2 to 5 years, 11 months), preteen (6 to 11 years, 11 months), teens (12 to 17 years, 11 months), adults (18 to 64 years, 11 months), and elderly (65 years and over). An advantage of using resident observers is that they often know or can easily find out the ages of the persons they are watching.

*In an 8 hour day, only 6 hours of observation can be expected from hired observers. The other two hours or more are required in writing up notes. Hence, the more stringent the budget, the more the reliance on informants, rather than hired observers.

In short surveys it is not wise to impose on observers the details of action patterns, behavior mechanisms, penetration levels or any of the other technical details of the behavior setting survey. It is found that they only tend to confuse the observers and detract from their more preferable (for the researcher) and less sophisticated view of behavior. The rating of these scales is better left to the professional researcher who will make full use of answers from informants and observers.

Of course, if some observers show sufficient interest and motivation there is no reason why they can't master these technicalities and be of more use in the rating process. The general finding is, however, that it is too much to ask of the average observer.

Collection of data

Once the observers have had their training period and achieved a fair reliability in observations (90% agreement or better), they can begin regularly scheduled periods of observation. Decisions need to be made about whether observations should cover: 1) the full 24-hour day, and 2) the full range of sidewalk and outdoor behavior within a preselected geographical area. For many design purposes the daylight and only part of the nighttime behavior will suffice. But if the effects of lighting, crime incidents or any of the other design problems of the night are to be studied, a complete 24-hour observation is necessary. Observers can't last for a full eight hours. A full hour of observation followed by a 15-min rest is a good procedure. If complete coverage is required, two observers can be staggered at any one post.

If all sidewalk and outdoor behavior needs to be recorded, then staggered teams need to cover every geographical area on the site. Project ARROWHEAD required 32 observers in staggered schedules for the first behavior setting survey. Needless to say, the supervision of such a group is a full-time job.

Observers can either use a form for recording observation periods of time, such as the one in Figure 2, or merely write out the observations with the dates, hours, and length of time of the behavior. Ordinary terms such as running, walking, whistling, or laughing, are adequate. Unusual styles of dress and the points of origin and ending of the behavior should be noted. Examples of observations from the ARROWHEAD Project (Bechtel 1972a, 1972b) follow:

Observer: C.R.

Date: 12/24/70 Time: 11:30 a.m.

Man carrying a gift in his arms, walking,

District J. Lasted 5 minutes

Observer: R.M.

Date: 1/4/71 Time: 2:30 p.m.

Three teen-males seen attempting to break into basement for old lady who dropped her key in the basement.

Average age of boys I'd say was about 13.

Time: 3 minutes

Observer: C.R.

Date: 1/8/71 Time: 5:00 p.m.

Pre-teen boy is riding crazy car in playground of District J.

Lasted 20 minutes.

Added together, these records constitute a global picture of life in the area being observed. Each observation can be placed into a setting and quantified according to the various behavior setting scales and measures. Observations are photocopied and then each separate observation is cut out and assigned to settings in folders.

7. *Narrative (journalistic Description)*. This is simply a narrative of what goes on in the setting. Its abstraction is the genotype across several similar settings. Once again, these are not marked on the coding sheet and are usually kept in the form of written or typed notes.
8. *Date and other elements*. Further descriptive aspects can be added or each aspect can be increased in detail as needed. It is a common practice to photograph each setting so that the relationship of occupants and environment is clearer. The use of behavior objects may require extensive observation if they are of concern.

Quantitative aspects of settings

As well as the descriptive aspects, there are usually several quantitative aspects of a setting which can be recorded. These include *frequency*, *duration*, *population* and *occupancy time*.

1. *Frequency* is the number of times a setting occurs within a given time reference, usually a year.
2. *Duration* is the number of hours a setting uses.
3. *Population* is the total number of persons who enter the setting. These are divided further into town and out-of-town persons (or block and out-of-block), and into age categories (see the setting data sheet, App. A1).
4. *Occupancy time* is the number of man-hours spent in each setting by each population group.

Rating scales

Penetration levels are one of the most important measures of behavior setting surveys. The penetration level is a measure of how central the person's performance is to the setting. There are six zones of penetration: 1) onlookers, 2) invited guests, 3) members, 4) performers, 5) joint leaders and 6) single leaders. Onlookers are the least involved. They resemble "sidewalk superintendents" at a construction job who are there but add nothing to the setting and have no influence on it. Invited guests resemble the audience at a football game or the audience at a play. They are necessary to the setting but have the lowest participation level in its functioning. Level 3 persons are the bona fide members: the persons who have a card saying they belong and who have certain rights as members. Level 4 persons are active functionaries or officers in the organization. They have some power in directing the course of events but are not the leaders. Examples are sergeants-at-arms, secretaries in offices, etc. Level 5 individuals are joint leaders. These are presidents and vice-presidents and other central officers who run an organization. In less formal settings, they are the leaders with the most social power. Level 6 individuals are single leaders, without whom the setting could not function. An example would be a one-man radio station, or a teacher in a one-room school house. If there is a level 6 leader, no other persons can be rated at level 5.

Penetration levels were used by Binding (1969) to study leadership in a small community. There are also the critical measures of participation in Barker and Gump's (1964) study of large and small schools, and Wicker used the first three levels to define non-performers and the top three to define performers in his study of participation in churches (Wicker 1969).

Measurement of penetration levels in any environment can determine the leadership levels available to residents of that environment and will also test whether the residents are taking advantage of them (Bechtel 1971, 1972a, 1972b).

Penetration levels have only been indirectly related to physical design aspects through the size of the setting. Wicker (1969), Willems (1964), Gump and Friesen (1964), and Barker (1968) have shown that larger organizations tend to have larger settings and smaller organizations smaller settings indicating that the average penetration level per person is higher for smaller settings. Since the penetration level is higher, the participation level is correspondingly so. Thus, forces toward higher participation levels are controlled through setting size.

Penetration levels are among the easiest of the rating scales to measure. Membership lists or organizations identify officers, newspapers often describe leading roles, and informants are likely to know who leads most settings.

Action pattern ratings

The standing behavior patterns in behavior settings are rated according to 11* categories of behavior: aesthetics, business, education, government, nutrition, personal appearance, physical health, professionalism, recreation, religion, and social contact. These are among the most difficult aspects of a behavior setting survey and they must be measured with great care. Usually the researcher or an observer will have to watch a number of setting occurrences with a stopwatch in hand to get accurate and reliable ratings.

Each of the action patterns is rated on a scale which ranges from 0 to 4. The total score is determined by adding four subscales: participation, supply, evaluation and appreciation, and teaching and learning. Ratings on the subscales are based on the percentage of occupancy time devoted to the particular action pattern.

Subscales for each of the action patterns are as follows.

Participation: Amount of the behavior devoted to the action pattern rated according to:

- 0 Action pattern does not occur
- 1 Occurs 1 to 20% of occupancy time
- 2 Occurs 21 to 40% of occupancy time
- 3 Occurs 41 to 60% of occupancy time
- 4 Occurs 61 to 80% of occupancy time
- 5 Occurs 81 to 100% of occupancy time.

Most classrooms, for example, would be rated at 5 on participation in education since education action patterns occur there during more than 81% of the occupancy time.

Supply: To rate on the supply subscale it must be observed that either a product or a person is prepared for another setting in the setting being measured. Obviously manufacturing would be high in this subscale, as would be any form of rehearsal for a performance.

Supply is rated similarly as participation but supply and participation ratings are exclusive. One action pattern cannot be rated on both, except additively, e.g., education 4, supply 2, total, 6. (A 6 total is possible because of the overlapping percentages.)

Evaluation and appreciation subscale: This is behavior that shows an appreciation or evaluation of the general behavior, or some part of the behavior, that occurs in the setting. An obvious example is clapping and a less obvious one is giving tests in school. The behavior must be open and explicit to be rated on this scale. Compliments, encouragement and other spontaneous acts are not rated. The behavior is usually a scheduled part of the behavior pattern.

The subscale is:

- 0 No explicit evaluation or appreciation
- 1 Less than half of occupancy time
- 2 More than half of occupancy time.

Teaching and learning: This includes the obvious behavior in classrooms but excludes learning which is not formal. This is rated on the same scale as evaluation (0, 1, 2).

*Harker and Wright (1955) originally had 13 action patterns, including orientation and philanthropy, in addition to the 11 cited above. These two were dropped by the time that Harker's 1968 book was published.

All action patterns are rated by summing the scores for the four subscales listed above. Very seldom does the researcher have any use for the data on subscales separately. Only the total score was used for comparisons in Bechtel (1971, 1972a, 1972b). Table IV lists the action pattern ratings for behavior settings of Westside.

Action pattern definitions

The definitions of these patterns which are below sometimes do not seem to fit field situations and may require an exercise of judgment on the part of the researcher. The best way to resolve such problems is often by observation, often by consulting informants, and more often by a combination of the two. The stopwatch is the final arbiter in judging percentages of occupancy time (Table IV).

1. *Aesthetics*. Barker (1968, p. 55) defines aesthetics as, "Any artistic activity; any behavior aimed at making the environment more beautiful, as this is locally defined." In the participation subscale he adds "removing the unsightly." This is an important aspect of many recent activities dealing with cleaning up the environment. Also, urban areas are more likely to have demolition settings such as the one in Westside (Table V).

Any kind of minimal effort to make a setting attractive usually rates as 1 (1-20% of occupancy time). The settings most commonly having to do with aesthetics are usually art classes, art supply stores, rehearsals, trash or garbage removal practices, and floral shops. Beauty shops are not usually included under aesthetics because the customers are beautifying themselves, an action pattern called *personal appearance*. But teaching personal appearance, as in the setting "charm class," does rate high on aesthetics.

2. *Business*. Barker (1968, p. 56) defines the business action pattern as "the exchange of goods, services, or privileges where payment is obligatory." This is exclusive of gifts or hiring for wages which is the *professionalism* action pattern. In the residential areas studied in Bechtel, Achelpohl and Binding (1971) and Bechtel (1972a, 1972b) there were few business settings originating in the areas measured, but several settings rating high in business within the city reached into the residential areas. These were the deliverymen, repairmen, etc.

Business can usually be rated by observing the actual time spent selling and transacting business vs the time spent socializing, daydreaming or on other personal matters. Many stores can rate surprisingly low on this action pattern.

3. *Education*. Education is easily defined by the formal educational roles of teacher and pupil. The informal teaching and learning that goes in many settings, for example among children, is not included. Public lectures do not rate on this action pattern. Home study courses, where there is a formal communication with someone who serves as a teacher, are rated 81-100%.

4. *Government*. This action pattern has to do with any form of government: local, county, state, or federal. Barker (1968, p. 58) defines this pattern as strictly having to do with law making, law interpretation, and law execution. This does not include paying at parking meters, but it does include giving tickets for overtime meters, police patrols, or working in the post office (but not buying stamps or mailing letters).

However, if some settings involve evaluation or appreciation of government, i.e. 4th of July picnic speeches, the setting will have a government rating. Usually, government ratings will be very minimal, as in the case of a church service offering a prayer to government, or maximal as in the mayor's office. Generally, lawyers' offices also receive very high government ratings.

5. *Nutrition*. Any behavior that involves eating, drinking or the preparation of food or drinks gets rated for nutrition. Any setting in which a person consumes food or drink is rated.

Table IV. Action patterns of behavior settings for Westside.*

Setting	Acst	Bus	Prof	Ed	Govt	Nutr	Pers	Phil	Phys Health	Rec	Rel	Soc Contract
Power & Light Crew	0	2	5	0	3	1	1	0	0	0	0	6
Robbery	0	1	6	0	0	0	1	0	0	0	0	5
Sidewalk	1	2	0	0	1	3	2	1	2	4	0	5
Bike riding	1	0	0	0	0	3	2	0	1	6	0	5
Road	1	1	1	0	1	2	1	1	0	2	0	2
Alley	1	2	2	0	0	1	1	0	1	1	0	3
Police Check	0	1	6	0	7	1	2	0	1	0	0	7
Telephone Repair	2	1	6	0	0	0	2	0	0	0	0	6
Mailman's Route	0	2	6	1	6	0	3	1	1	1	1	3
TV Repair	0	4	6	1	1	0	2	0	0	4	1	5
Demolition	5	3	0	0	3	2	1	0	0	0	0	3
Health Ctr. Study	0	0	5	1	4	0	1	2	6	0	0	5
Door-to-door Sales	0	4	5	0	2	3	0	0	0	0	1	5
Football	0	0	0	0	0	4	0	0	0	6	0	5
Playing in Park	0	0	0	1	0	0	0	0	0	6	0	5
Bus Stop	0	1	2	0	1	3	1	0	0	2	0	6
Garbage Collection	5	0	5	0	5	0	2	0	0	0	0	3
News Delivery	0	1	6	1	1	0	1	0	1	3	1	3
Trash Collection	5	2	6	0	2	0	0	0	0	0	0	4
City Street Crew	2	0	6	0	5	0	2	0	0	0	0	4
Florist Delivery	6	3	5	0	1	0	1	0	0	0	2	3

*From data not reported in Bechtel, Achelpohl and Binding (1971).

Philanthropy was dropped by Barker (1968) but kept by Binding (1969), Bechtel, Achelpohl and Binding, 1971, and Bechtel 1971, 1972a, 1972b. It was not found to be useful.

Table V. Settings rated high in aesthetics.

East Side	West Side	ARROWHILL
Around the house (4)	Florist delivery (6)	African drums class (8)
	Trash collection (5)	Charm class (7)
	Garbage collection (4)	Creativity unlimited (7)
	Demolition (4)	Arts and crafts (adults) (7)
		Arts and crafts (boys) (7)
		Arts and crafts (girls) (7)
		Adult sewing class (6)
		Marching (6)
		Maintenance office (6)
		Puppetry class (6)
		Incinerators (5)
		Modernization program (5)
		Christmas caroling (5)

The measures and rating scales

The measures and rating scales are the most intricate and troublesome part of a behavior setting survey. They are intricate because they involve a great many behavioral details that go on in each setting; troublesome because a great deal of effort must be made to attain reliability and validity. The more global measures such as occupancy time, richness index, and penetration level can be used either for more general views of the entire community or for measures of each individual setting or groups of settings.

Each setting has a *name*, a *class*, a *genotype*, a *unit*, a *locus*, a *soma*, a *narrative*, and a *date*. These are usually recorded on the setting code sheet

1. The *name* simply refers to the common name given to the setting by the local population: history class, boy scout meeting, church picnic, etc.
2. The *class* indicates whether it is a business, church, government, school, or voluntary association.
3. The *genotype* is the general classification of settings according to their similarity of standing patterns of behavior. Common genotypes are listed in Barker (1968, App. 2). They include a description of the behavior program, and penetration classes (see below) of the inhabitants. For example (Barker 1968, p. 212):

Attorneys' Offices. Lawyers (penetration levels 5 or 6) initiate legal actions, prepare legal defense in civil and criminal cases, give legal advice, draw up contracts, prepare wills, prepare federal and state income tax returns, manage office; secretary (penetration level 4) carries out office routines; clients (penetration level 3) seek and pay for advice and service.

4. The *unit* of the setting refers to the setting which controls all others within an authority system of settings; e.g., one setting (the manager's office) controls many other settings in the public housing environment in ARROWHEAD (Bechtel 1972b). See columns 13-15 of the behavior setting code sheet.
5. The *locus* of the setting refers to whether it is in the specific geographical area being studied. In Barker's (1968) study it was:
 - a) in town
 - b) in town, rotating
 - c) in town, but no town occupants
 - d) out of town

In the residential area study (Bechtel, Achelpohl and Binding 1971) it was:

- a) in block
- b) in block, rotating
- c) in block but no block participants
- d) out of block.

This could have been extended to "e) out of block, in the city" and "f) out of block, out of city," if these measures were desired on residents who worked outside the residency area.

6. *Soma*. This is a term used to describe the physical aspects of a setting, especially critical for design-oriented professionals. Ordinarily these descriptions are made in an informal manner by social scientists, but for design research a design professional might want a highly technical description.

These are not recorded on the code sheet but are kept in the form of written or typed notes, sometimes accompanied by photographs.

6. *Personal appearance.* This is not a functional classification; it deals with trying to look well rather than dressing for environmental conditions. Thus, "dressing up" for a party would get a rating but dressing for the cold would not. Many differences exist among geographical areas as to what constitutes "dressing up." For example, at a Kansas City high school, students took a great deal of care to dress up in the "hoboest looking clothes." They would go to such lengths as to tear holes in the clothing, wrinkle them through an old-fashioned set of washer rollers, and paint and stain them. (This led to a tie-dying fad later.) The important thing to keep in mind is the current local definition of what is "dressed up" and what is house dress. Informants and observers are especially critical here. Personal appearance also includes such items as make-up, hair style, and general grooming. The lowest end of the scale is what would be expected in the home rather than the public environment. It includes hair curlers, robes, etc. Barker (1968, p. 61) suggests the following scale:

- 0 House clothing and adornment
- 1 Street, school, work clothes
- 2 Dressing for church or Sunday School
- 3 Dressing for a semiformal
- 4 Formal dress affairs
- 5 Fancy dress balls, ceremonial dress.

Uniforms count only as work clothes, unless they are dress uniforms or are in out-of-context settings, i.e., police uniforms at school, army uniforms in church.

7. *Physical health.* This action pattern concerns all behavior directed at preserving physical (not mental) health. It includes clinics, doctors' offices, the school nurse, physical examinations, classes in first aid, etc.

8. *Professionalism.* This is a very narrowly defined behavior pattern having only to do with the payment of wages. The following scale is from Barker (1968, p. 63):

- 0 Performers receive no pay
- 1 1-20% of occupancy time of performers is paid
- 2 21-40% of occupancy time of performers is paid
- 3 41-60% of occupancy time of performers is paid
- 4 61-80% of occupancy time of performers is paid
- 5 81-100% of occupancy time of performers is paid.

9. *Recreation.* Barker (1968, p. 64) defines the recreational action pattern as "behavior that gives immediate gratification: consummatory behavior: play, sport, games." Settings range from those that are entirely devoted to recreation (such as parties, movies, dances, and swimming pools), to those that are flexible (such as drug stores or restaurants), to those that are never rated (such as banks, attorneys' offices, courts, and religious worship).

10. *Religion.* Religion is closely tied to a worship service. When prayers are offered at banquets or sports events these are rated as 1.

11. *Social contact.* This action pattern is defined by Barker (1968, p. 66) as "having interpersonal relations of any kind." There is no setting that will not have some rating on this action pattern. Even a play in which there is absolute silence in the audience will be rated because the players are communicating to the audience. Low ratings are in settings where people work alone and hence have no one to interact with.

Behavior mechanisms

Action patterns classify the type of global behavior happening in the setting, such as aesthetic, business, or religious, while behavior mechanisms classify the personal units of behavior, affective

behavior, gross motor activity, manipulations, talking, and thinking.

1. *Affective behavior.* Affective behavior is another term for emotional behavior. Any of the visible signs of emotion are scored for the affective behavior mechanism. Strong outward signs such as yelling, screaming, crying, and normal activities with an emotional tone such as singing with strong feeling, cheering at a football game, or quiet reverence in a church are scored for this mechanism.

2. *Gross motor activity.* This behavior mechanism involves the use of the large muscles of the body and includes such activities as walking, running, swimming, and almost anything except sitting. (An odd exception to this in the late 1960's was the custom of some teenagers to swing their arms to music while sitting at tables.)

3. *Manipulation.* This behavior mechanism involves the use of the hands. It may or may not be accompanied by gross motor activity. Use of the hands includes such things as clapping, and tapping of fingers, as well as pushing, pulling and the use of any kind of hard tool or the holding of books, turning of pages, etc.

4. *Talking.* This includes any form of verbal expression whether words are articulated or not and may overlap with affective behavior.

5. *Thinking.* It is hard to observe thinking so it is scored almost always as a result of having to solve a problem or make a decision. Barker (1968, p. 69) scores it entirely on a basis of how much occupancy time of a setting is concerned with problem solving or decision making. There are three subscales for behavior mechanism: participation, tempo, and intensity.

Participation. This is rated similarly to the action patterns:

- 0 Occurs less than 10% of occupancy time
- 1 Occurs 10-33% of occupancy time
- 2 Occurs 34-66% of occupancy time
- 3 Occurs 67-90% of occupancy time
- 4 Occurs more than 90% of occupancy time.

Tempo. This is the maximum speed at which the behavior is performed normally. The pace of walking on the sidewalk is much brisker than the walking in a cafeteria line. The rating is given to the average pace, not the unusual. For example, out of 58,137 persons observed on the sidewalk at ARROWHEAD (Bechtel 1972a) 551 were seen running. The running was not averaged with the walking, but only the walking, at its maximum speed, was considered in the rating.

Barker's (1968, p. 67) scale is as follows:

- 0 When the mechanism occurs, its maximal normal speed is slow; reaction times are longer
- 1 The maximal normal speed of the mechanism is in the median range, neither fast nor slow
- 2 The maximal normal speed of the mechanism is above the median range
- 3 The maximal normal speed of the mechanism is near the physiological limit.

Usually athletic events, such as basketball, football and track are rated at 3 for the performers. Most other settings are at 1, with only a few at 2, when it is seen that the performers are constantly in a hurry.

Intensity. Intensity is rated according to the maximum rate of energy expended (Barker 1968, p. 68):

- 0 When the mechanism occurs, the maximum normal rate of expenditure is very low
- 1 Maximal normal energy expenditure is in the median range
- 2 Maximal normal energy expenditure is above the median range
- 3 Maximal normal energy exerted is near the physiological limit.

Again, athletic events usually rate at 3, although teenage dances of the present era will also rate 3. Behavior setting mechanisms are rated for each setting by adding the sum of the scores for each subscale. The possible range for each mechanism is 0 to 10.

More global measures

In addition to the action patterns and behavior mechanisms, which can largely be observed by the actions of people in the settings, there are several more global measures which are inferred from the rules of the setting or calculated by combining other measures. These measures include *richness*, *pressure*, *welfare*, and *autonomy*.

1. *Richness*. Richness of a setting is a calculation of the exposure of occupants of a range of ages to varieties of behavior. The greater the range of occupant groups of all ages, the higher are the penetration levels, and the greater the behavior mechanisms and action patterns, the higher is the richness index. The general richness index is calculated by summing the penetration ratings of the population subgroups, the ratings of all the action patterns, the ratings of all the behavior mechanisms, and weighting the sum for the occupancy time of the setting.

The occupancy time is coded by arranging occupancy times from the lowest to the highest and coding by intervals. Each interval is then ranked and the rank number is the code used (see Barker 1968, App. 1).

The general richness (GRI) index is then calculated by the following formula (Barker 1968, p. 70).

$$GRI = \frac{(\sum PenR + ApR + \sum BmR)cOT}{100}$$

where PenR = Penetration ratings of the setting

ApR = Action pattern ratings of the setting

BmR = Behavior mechanism rating of the setting

cOT = Code number of occupancy time.

General richness indices of settings vary from location to location. Barker (1968) reports a GRI range of from 57 to 1. Barker does not use a mean GRI for all settings. In the Kansas City study (Bechtel, Achelpohl and Binding 1971) the GRI range extended from 19.7 to 0.7 for East Side and 24.5 to 1.6 for West Side. The mean of the GRI indices for East Side (N = 23 settings) was 5.19; for West Side (N = 46 settings) it was 7.8%. At project ARROWHEAD, a public housing estate, the range was from 24 to 0.51 with a mean of 8.54 for 67 settings. Thus, the residential areas of the public housing environment in Cleveland provided a richer behavioral environment than either of the two residential areas studied in Kansas City, but all of these were less rich than the small town environment. If richness of behavior is the goal of design, then the small town environment is the one to emulate.

2. *Pressure*. Pressure is the degree to which forces outside the setting act to bring a person into a setting or tend to make him avoid it. This implies nothing about the attractive or repulsive qualities of the setting itself. Barker (1968, p. 71) developed the following scale to rate pressure of behavior settings on children, but it could just as well be adapted for adolescents, the elderly, or the middle-aged.

1. *Required*. Children are required to enter the setting; they have no choice. An example is school classes, but they are rated only for children of school age.
2. *Urged*. Eligible children are pressured but not required to attend. They have some choice, e.g., Cub Scouts.

3. Invited. Eligible children are welcomed to the setting. They are asked to attend.
4. Neutral. Children are free to enter this setting equally with others; there is no positive or negative discrimination with respect to children.
5. Tolerated. Children are not welcomed to the setting. Others can enter more freely than children; there is resistance to children but it is not strong.
6. Resisted. Children are pressured not to enter the setting, but they are not forbidden. There must be strong reasons (counter pressures) to allow a child to enter.
7. Prohibited. Children are excluded; e.g. they are excluded from organization meetings like those of the Masonic Lodge.

Pressure ratings for both children and adolescents were calculated for ARROWHEAD (Bechtel 1972a), as in Table VI.

Table VI. Pressure ratings for children and adolescents for ARROWHEAD project (from Bechtel 1972c).

Rating	Children		Adolescents	
	No. settings	%	No. settings	%
1	1	1.5	2	3
2-3	15	22.4	19	28.4
4	22	32.8	22	32.8
5-6	28	41.8	23	34.3
7	1	1.5	1	1.5

3. *Welfare*. Welfare rates designate whether a setting exists for a certain age group or not. Barker (1968, p. 75) uses this rating to test whether the setting exists for children but it could just as well be used for other age groups. His scale, directed toward welfare rating for children is as follows (Barker 1968, p. 75):

0 The setting is not concerned with children

1 Serves child members. The setting serves the welfare of its child inhabitants: its product of output is children processed in a particular way: educated, recreated, strengthened, fed, bathed, etc. The processing must be exclusively for children, not people in general.

2 Serves children in other settings. The setting instigates and supports *other* settings that are primarily for the welfare of children; it has no child members itself. The setting fosters other settings that are rated 1 on child welfare. This rating is only given if the setting would itself cease if the setting it fosters ceases. An example is the elementary school board meeting.

3 Children serve other members. The setting has child performers who operate the setting for the benefit of the members of other age groups, for example, PTA meetings where children sometimes provide the program.

4. *Autonomy*. Barker (1968, p. 76) refers to this scale as *local* autonomy. This scale must be adapted to the locale. In Barker's studies the town was the unit of autonomy. In *East Side, West Side* (Bechtel, Achelpohl and Binding 1971) it was the city block and in ARROWHEAD (Bechtel 1971a, 1972b) it was the arbitrarily chosen sector of a public housing estate.

Ratings are made according to whether four decisions: appointment of performers, admittance of members, determination of fees and prices, and establishment of programs and schedules occur within five geographical areas according to an everdecreasing proximity to the setting as follows.

within the town (Block, project, estate)
 outside the town but within the school district
 outside the district but within the county
 outside the county but within the state
 outside the state but within the nation.

The highest autonomy rating is 9; it indicates that the four decisions are made entirely within the unit of study (town, block, project, etc.); that the setting has maximum autonomy. A rating of 1 means that the four decisions are made at the national level. Rating 3 means state level, 5 county level; and 7 school district level.

Many times the four decisions will be made at different levels. In these cases, the relative weight is scored by multiplying the percentage times the rating. For example, if 25% of the decisions are made at the unit of study (most local) this is multiplied times nine for a score of 2.25, and if 75% are made at the county level, this is multiplied times five for a score of 3.75, with a total autonomy score of 6.00.

Autonomy levels were found to be extremely critical measures in the ARROWHEAD project (Bechtel 1972b). This scale relates directly to design in the sense that it is a measure of how closely the building, town, or block population is controlled by outside forces. Other things being equal, the more the outside forces are controlled, the less chance they have to influence or be influenced by the physical environment.

A prime example of outside interference with the physical environment is the management dictum that the occupants of a physical environment cannot interfere with any part of it. While Barker's autonomy scale does not directly measure such management practices, its measures pick up a general management tone of strictness, dependence, or similar interferences by its measure of *amount* of autonomy left to the local residents. For example, it was found (Bechtel 1972b) that the percentage of the four decisions made by the Public Housing Authority in Cleveland amounted to 68% in all the public settings of the ARROWHEAD residential area. The result was a dependent environment where so few decisions were left to the residents that they became dependent on management.

More research is needed to explore the ramifications of autonomy, but it is already clear that without high autonomy levels of residents, any design intention can be overwhelmed.

Recording and coding the data

Each setting has a standard form which allows scoring for each of the rating scales. All of the instructions are repeated for each scale since the person scoring is not expected to remember all of them. It is desirable to record the scoring of a setting on film so that scorers can build up a reliability.

Then, when all the settings have been scored, the code sheet in Figure 3 is used to record the scores of each setting for card punching and computer analysis.

The recording process can be recapitulated as follows.

1. Making a preliminary setting list from newspapers, informants and other sources
2. Applying the K-21 scale to questionable settings
3. Making a prefinal setting list
4. Taking observations over a given time period
5. Collecting all sources, observations, informants, etc., for the final list
6. Calculating ratings by rating form sheets
7. Checking the reliability and validity of ratings
8. Putting the ratings and other data on code sheets
9. Card punching and computer analysis.

Name: _____

Genotype # 1-4: _____ Authority System 9-10: _____ No. of 12-14 Occurrences: _____

Behavior Setting No. 5-8: _____ Class of Authority System 11: _____

Occupancy Time of Base Subgroups

Group	Col.No.	No.P.	Col.No.	U.T.
On Base	ML 15-18:		42-46:	
Inf	C 19-22:		47-51:	
	ML 23-26:		52-56:	
Presch	C 27-30:		57-61:	
	ML 31-34:		52-66:	
Y S	C 35-38:		67-71:	
O S	ML 39-42:		72-76:	
End of Card (2)				
Behavior Setting No. 1-4: _____				
U S	C 43-46:		10-14:	
	ML 47-50:		15-19:	
Adol	C 51-54:		20-25:	
	ML 55-58:		26-30:	
Adult	C 59-62:		31-35:	
Aged	ML 63-66:		36-41:	
	C 71-74:		42-46:	
Males				
Building No. 75-78: _____				
End of Card (1)				
Behavior Setting No. 1-4: _____				
	ML 5-8:		47-51:	
Females	C 9-12:		52-56:	
Negroes	13-16:		57-61:	
Whites	17-20:		62-67:	
On Base ML	21-24:		68-73:	
Total	C 25-28:		74-78:	
End of Card (3)				
Behavior Setting No. 1-4: _____				
Off Base	ML 29-32:		5-9:	
Total	C 33-36:		10-14:	
Grand Total	37-41:		15-20:	
Total _____				
Duration 21-25 _____				

Max. Pene. of Subgroups

Group	Col.No.
Inf	26
Presch	27
Y S	28
O S	29
Adol	30
Adult	31
Aged	32
Males	33
Females	34
Negroes	35
Whites	36
Social C. Pen. L.	
I	37
II	38
III	39
IV	40
Grand Max.	41-42
Performers (number)	
On Base ML	43-45
Total	C 46-48
Off Base ML	49-50
Total	C 51-53
Grand Total	54-57
Perf/Pop.	58-5
White Perf	60-63
Negro Perf	64-66
End of Card (4)	
Behavior Setting No. 1-4: _____	

ACTION PATTERN

DATE
Acc: 5:
Bus: 6:
Prof: 7:
Educ: 8:
Govt: 9:
Nutr: 10:
PersAp: 11:
Phyl: 12:
PhysH: 13:
Rec: 14:
Rel: 15:
Soc: 16:

MECHANISM RATE

AffB: 17:
GroHt: 18:
Manp: 19:
Talk: 20:
Think: 21:

GEN

RICH: 22-23:

Pressure Rating

Child: 24:
Adol: 25:

Welfare Rating

Child: 26:
Adol: 27:

Autonomy Rating

Wtd: 28:

Social C. O.Y.

I 29-33:
II 34-38:
VII 39-43:
IV 44-48:

E, O or I 49:

Jan. 50:
Febr. 51:
March 52:
April 53:
May 54:
June 55:
July 56:
Aug. 57:
Sept. 58:
Oct. 59:
Nov. 60:
Dec. 61:

(End of Card 5)

1976 Behavior setting data sheet - cold regions habitability - military installations

Figure 3 Behavior setting data sheet.

PART II. RESEARCH FINDINGS: THE COLD REGIONS ENVIRONMENT

THE MILITARY IN COLD REGIONS

The central concept around which this report is organized is the finding that the military in Alaska have a *temporary environment*. By the attitudes expressed, the length of stay, the behavior of families and military personnel, and the life styles of the majority of persons on post, the stay in Alaska is regarded by most as a temporary condition at best. The researchers do not have enough information to determine how much of this is typical at military posts everywhere, but it certainly seems to be true for Alaska. This temporary outlook has significant consequences on how life is lived in Alaska. It must be noted that *the basic assumption underlying this report is that the Army will continue in its policies that make Alaskan environments temporary*. Should this policy change, the direction of recommendations would need to be changed somewhat.

The fact that life in military bases in Alaska is temporary is chiefly determined by the short tour of duty. The shortest tour found in this report was in the Air Force, which sent men to its AC&W (Aircraft Control & Warning) stations for 12 months with one month leave. The average GI in the barracks at Fort Wainwright had been on post for 13½ months, just a little longer. In family housing, the average enlisted man or officer at Fort Wainwright had been on post 17½ months. Even the senior occupants interviewed, who had been on post longer than other senior occupants in the housing court studied (1 out of 8 persons), had only 20.8 months of residence. These short military stays contrasted to the FAA (Federal Aviation Agency) personnel at Cordova, for instance, where the average was 69.8 months. In the more southern parts of the United States it was found in one public housing project (Bechtel 1973a) that the average length of stay was 99.3 months. Even the national data on public housing show that over half of the population has lived more than five years on one site. And, it must be remembered that the government built public housing as *temporary* housing.

Therefore, when compared with other civilian populations in Alaska and the rest of the United States, the length of stay of military personnel is short and the consequences of the large turnover are significant. Most people encountered in the research regarded their stay as a temporary period in an otherwise normal career. This contrasted to FAA and other civilian personnel who often viewed Alaska as their home, some even expressing a distaste for life in the crowded "lower 48." If the mission of the Army in Alaska is to provide a defense for cold regions, then a question may be raised as to whether this can best be done by temporary personnel. The average GI's personal investment in learning to become a cold regions soldier is reflected by the barracks questionnaire responses in which 23% of the troops wanted to eliminate field exercises in the winter.*

The temporary, almost careless nature of adjustment to Alaska is also reflected in the incidence of frostbite. Each person entering the Alaskan region is instructed in proper dress for the extreme cold of the winter, and is issued field tested equipment for use under such conditions. In addition, many soldiers are given specific instructions in the field under winter conditions to thoroughly familiarize them with proper dress in cold weather. In spite of this, it was found that 384 of every 1000 men suffer frostbite in some degree. Details of this finding are found in Appendix C, and it seems clear that frostbite is far more common than previously suspected (Doolittle 1972).

Large versus small installations

One of the most critical aspects of how to manage and perform in the cold regions military environment is the particular advantage that small bases seem to have over large ones in terms of several satisfaction measures for personnel. All the details of this major difference are beyond the scope of this project, but an example from recreational data will amply illustrate the point.

The large attendance at movie theaters, on the small vs the large installations studied, illustrates how larger installations operate to lower attendance and participation rates. The average attendance for one year at movies for the three AC&W stations studied is as follows:

*When asked, "Is there anything about Army life in Alaska that you feel should be changed?" 23% replied they wanted field exercises in winter eliminated.

Kotzebue	45.9 persons per showing
Campion	17.6 persons per showing
Murphy Dome	34.7 persons per showing.

These data contrast to Fort Wainwright where the average number of persons per showing is about 285 for the same year. At first, it may seem as though attendance at Fort Wainwright is much higher than at the smaller bases, but when average attendance at the theaters is measured as a percentage of population (and with a nearly identical number of showings per year), then the following percentages occur:

Kotzebue	47%
Campion	16%
Murphy Dome	23%
Fort Wainwright	4%.

In other words, the lowest percentage of population at the smaller installations has four times the percentage of its population in attendance, on the average, as does the large base.

The use of the library also affirms the tendency of the smaller installations to get better participation than the larger ones. Using the number of books divided by the total population, the ratios are calculated as follows:

Kotzebue	48 books per person
Campion	6 books per person
Murphy Dome	18 books per person
Fort Wainwright	9 books per person.

The ratios are not as extreme in contrast as the movie theaters, but the trend is clearly the same.

Why does there tend to be less participation in larger installations? Barker (1960) has a theory to explain this phenomenon called undermanning theory. Briefly, the theory states that, as organizations grow, the tendency is to overpopulate their behavior settings and this creates pressure on individuals *not* to participate. By contrast, smaller organizations tend to have too few persons in their settings and consequently there is pressure on each one to contribute more. Thus, we find in the smaller installations a greater percentage of the population going to the movies and borrowing more books. This principle extends, however, to *all* forms of participation. One of the reasons for the reduced participation levels at larger installations is provided by the Army Construction Criteria Manual of 1972.

The decreed number of theater seats for size of installation is given below:*

Ratio of persons to seats	Population	No. of seats
5.7	1- 2,000	350
5.4	2- 3,000	550
7.0	3- 7,000	1,000
6.6	7-10,000	1,500
7.5	10-15,000	2,000
8.0	15-20,000	2,500
8.3	20-25,000	3,000

As can be seen from these data, the number of persons per seat increases from 5.7 in an installation of 1,000 to 2,000, to 8.3 persons per seat in an installation of 25,000 persons. Therefore, encouragement of decreased participation levels is institutionalized in military planning and construction for bases at all levels.

*Taken from *Construction Criteria Manual*, DODM270.1-M, October 1, 1972, p. 3-49, Table 3-54.

Data from the U.S. Air Force also confirm the findings that individuals at small bases participate more in public recreational events. As can be seen from Table VII, auto hobby is the only activity with less frequent participation at the remote sites than at the bases, and this is largely because the facilities for automobiles are restricted or nonexistent on many of the remote sites.

Table VII. Participation in recreational events as a percentage of total population at Alaskan Air Force installations.*

Activity	Remote sites (N = 15) (Avg. pop. 254)	Eielson AFB (Pop. 3,208)	Elmendorf AFB (Pop. 91,181)
	(Avg. pop. 254)	(Pop. 3,208)	(Pop. 91,181)
Gymnasium	76.6	47.5	54.2
Library	72.3	39.0	38.1
Bowling	70.0	60.2	43.9
Recreation Center	58.1	22.7	20.4
Photography and Electronics Hobby	23.8	7.6	9.0
Wood Hobby	20.0	12.7	12.6
Auto Hobby	18.1	35.6	31.3
Golf Course	15.8	3.4	11.6

*Taken from Attachment 2, Study No. AAC 74-006, *Analysis of AAC Recreation Opinion Survey*, 4 February 1974 (Categories "1-3 Times a Month" and "Once a Week or More" combined).

Theater attendance is even more marked in differences. Only 9.6% of remote station personnel report *never* attending the theater, while 50.4% of Elmendorf personnel and 27.7% of Eielson personnel report *never* attending.

The policy implications of the decreased participation levels are far-reaching in their effects on cold regions personnel. First, in the Alaskan environment where resources are meager at best, the building of large installations only further exacerbates the lack of amenities. Second, the fact that large installations tend to reduce participation levels produces a self-defeating kind of economy in planning. If participation levels are reduced, then the cost level per man goes down in constructing recreational buildings and providing recreational service, but personal satisfaction may be sacrificed.

The dilemma of cold regions personnel is to choose between an isolated small post where they can participate and feel needed or a large base where they have more amenities but tend not to use them. From a management standpoint and from reports of morale and available data on psychiatric counseling, the small installation seems to be preferable from a personal satisfaction standpoint.

Race relations. Another important reflection of the influence of installation size on behavior of residents is in the area of race relations. Although no hard data were collected at any of the locations studied, the researchers made a point of asking black soldiers and airmen how they felt about race relations at their particular stations or posts. The airmen at AC&W stations consistently maintained that race was not a problem there. By contrast, nearly every black soldier at Fort Wainwright who was interviewed felt that there was some difficulty on post concerning race relations. Some of these answers may have been influenced by the highly visible flare-ups that had recently occurred at Fort Wainwright. (A few months previous to the interviews there had been a shooting between whites and blacks on a military bus. Previous to that, black soldiers had demonstrated against discrimination in bars and entertainment establishments in downtown Fairbanks.) All of the persons interviewed who had been on post for the past several months knew of these incidents and a few mentioned them specifically. By contrast, the personnel at AC&W stations reported no incidents that they could remember.

One objective measure of participation levels is the penetration scale. For this scale penetration levels are measured for every behavior setting and the populations of each setting are divided into performers and nonperformers. Performers are considered to be the leaders in a setting. Performers are also divided into whites and blacks so that a leadership ratio of whites and blacks can be established.

In the AC&W stations there were 3.843 white performers, on the average, for each setting and only 0.221 black performers. The 1,586 settings measured at Fort Wainwright had 5.550 white performers, on the average, and 1.149 black performers. Thus the ratio of black to white performers was higher for Fort Wainwright (0.207) than it was for the AC&W stations (0.057). In fact, the ratio at Fort Wainwright was even higher than the percentage of blacks at Fort Wainwright (12%). Thus, even though blacks have many more leadership opportunities at Fort Wainwright, the number of racial incidents is higher and the reported strain of race relations is also higher. The researchers tentatively assign this result, at least partly, to the effect of being in a larger base where there is greater anonymity.

Dependent populations. Though most of the data on civilian population will be investigated in the sections on family and transient housing, one fact seems to stand out when considering problems of managing and constructing cold regions installations. The housewife, if she does not work, spends on the average over 20 of every 24 hours inside her house. Therefore, she is the person most in contact with the same indoor environment, the person most affected by it, and the person with the least mobility and other resources to cope with the environmental press of cold regions. Couple this with the frequent absences of her husband from home on TDY (temporary duty) and field exercises and the result is often a situation of extreme stress when the wife is left to run the home alone. In determining how resources are to be allotted in a cold regions installation, the nonworking wife is more of a key individual than the military husband, for his morale and performance are often determined by her well-being.

Efforts are made to engage the wives in various social activities at the bases but very few wives participate. This low participation rate may result from the effect of the large installation on participation levels in general, or it may be a combination of several other factors.

For example, the forty families of the random sample generated fourteen public settings in and from the home. These settings had an annual occupancy time of 1,588 hours. The 27 senior occupants who tended to be on post only three months longer generated 25 settings with 7,139 annual hours occupancy time. This is an indication that the senior occupants' wives commanded a greater number of the recreational and social settings at the post. A few people tended to dominate these kinds of settings. For example, one senior occupant's wife led eight of the 25 settings, accounting for 5,166 hours of the occupancy time, or 72% of all the occupancy time of settings generated from the homes of the 27 senior occupants - 325% more than the total occupancy time of settings generated from the 40 homes of the random sample.

The researchers discovered four such social "stars" among the population of Fort Wainwright and they heavily dominated social life. This situation tended to exist because most of the social activities required a considerable amount of volunteer time and the social stars were among the people who were more willing to give this time. The social stars were also divided by rank: two were officers' wives and two were enlisted men's wives. Much of the social power and prestige of the social and recreational settings tended to be dominated by these few.

Location and design of facilities

In the family housing survey the most frequently mentioned services that could stand improvement were the commissary and the PX. The PX and commissary were mentioned, next to the cold weather, as the most noticeable features of Fort Wainwright. The researchers picked up many clues to the undesirability of these services by observing their functioning.

The commissary (see Fig. 4) services lack design facilities for dealing with the problems of a cold regions environment. First, the rules (wisely) do not permit leaving children alone in cars while the mother shops. This means that she must bring the children with her and carry or lead them about the store.

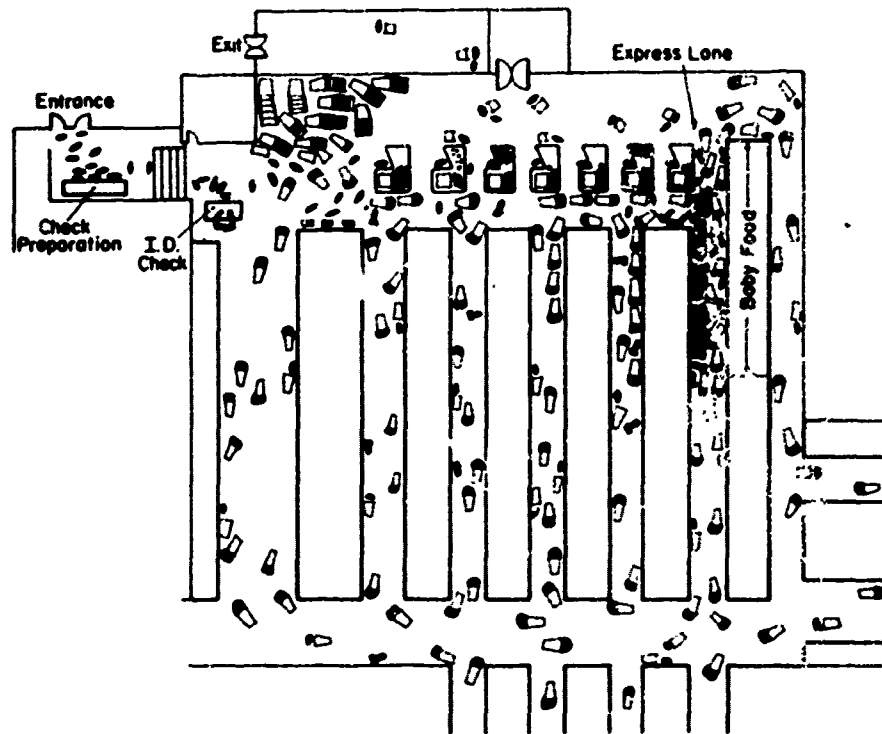


Figure 4. Fort Wainwright Commissary, showing confusion at checkout and baby food aisle.

The check cashing and admission area at the entrance to the commissary precludes access to shopping carts. Therefore, this area is one of great discomfort in the effort to juggle coats, children, and pocketbooks. In the grocery area it is not uncommon for coats and children to completely fill a shopping cart while a second cart is used for groceries. Hence, the need for some other carrying vehicle in this area.

Aisles, in general, are too narrow in both the check cashing and grocery areas, considering the number of children and coats and the need for more space under these conditions. For example, the aisle in the baby food area, where shoppers are most likely to be carrying babies, is also the aisle where customers carrying small baskets must wait in line for the express lane, with resultant crowding, pushing and frustration.

Finally, the checkout procedure requires that people wait in line in various other aisles in the store, causing those aisles to be inaccessible at times to shoppers. A shopper must unload groceries onto a conveyor while the cart is still jutting into the main aisle, often leaving the second cart with children and coats blocking the aisle entirely. The customer must then return empty carts to the entry way, once again juggling coats and children, and return in time to pay the bill. The customer has no opportunity then to see whether the bill was counted properly at the cash register.

Seldom can the bill be paid, the children dressed, and the cart returned before the sack boy finishes packing the groceries. Sack boys stand and wait impatiently until they can carry the groceries to the car.

Most respondents also mentioned that the selection of items at both the PX and the commissary was poor and not diverse enough, compared to Fairbanks facilities. Especially deficient were clothing items for small children in the PX.

At the PX (see Fig. 5), the check cashing procedure and the struggle with children and coats is not as long as at the commissary because customers usually do not have to be approved before entering. Once inside, however, pushcarts are seldom available, and even when they are, are not adequate for carrying children. Some aisles at the PX are so narrow that the pushcarts actually rub the merchandise in passing.

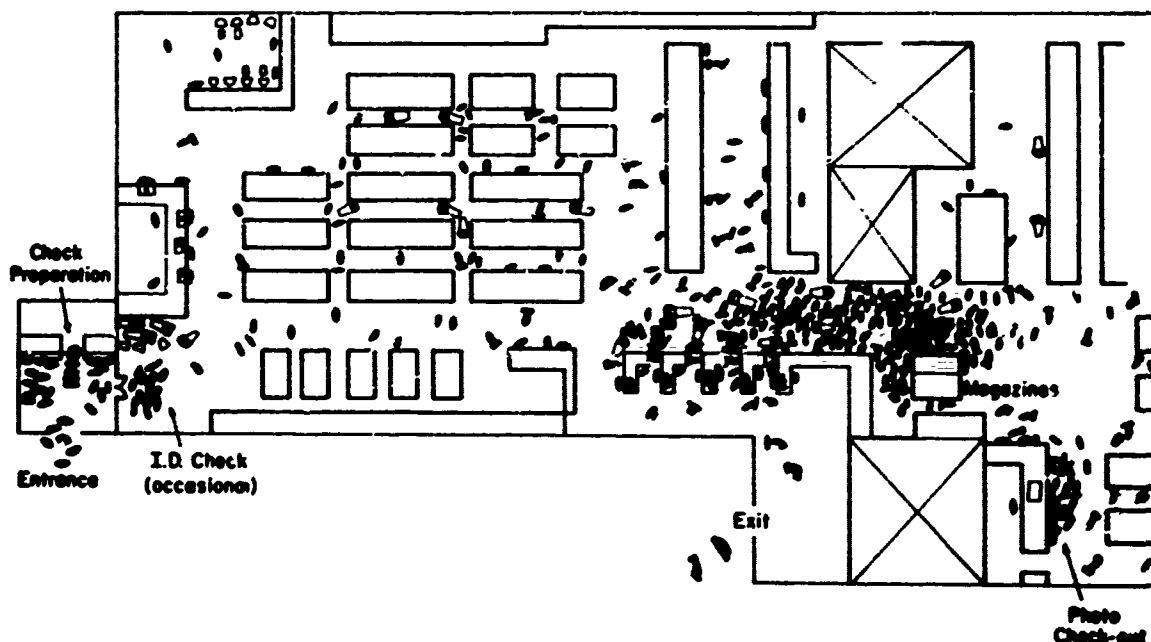


Figure 5. Fort Wainwright PX, showing check approval window, congested aisles and checkout area, magazine rack and photo department checkout.

The PX is divided into two main sections with checkout counters at the narrow passageway between them. This tends to crowd the area between the sections with customers waiting at check-out and customers passing from one section to the other. In addition, the magazine stand is located in the same area, adding a third group of customers to the congestion.

The security system of the PX often frustrates customers. Because of the check approval system and the special requirements for separate inventory at the photo counter, some customers are forced into writing two checks. This occurs when a customer first gets one check approved outside the PX in the usual manner. When he enters the photo area and wants to buy something, he is then presented with the dilemma of trying to collect all his other purchases for one checkout at the photo counter or writing two checks, one to cover photo purchases and the other for purchases in other departments. Since the bank system on post requires a high balance to avoid service charges, customers naturally are motivated to write as few checks as possible, since most of them are not able to keep the high balance required to avoid these service charges.

If customers are uncertain that they will find the items they want, they must take two trips into the store. The first is to find out if the items are available (and where to store them while they go outside to get a check approved). The second trip sends them back into the store with approved check to purchase the items. All this could be avoided if the check-certifying window were inside the store as it is in many PX installations.

To further compound the customer's problems, the Four Seasons Store (which sells mostly hobby and sporting equipment) is located $\frac{1}{2}$ mile from the PX. This means that if desired items are not found in the main PX a trip to the Four Seasons may be necessary.

The PX service station, with auto supplies, is 1.2 miles from the main PX. Quite clearly, if all of these three facilities were located centrally, the customer would save much time and gasoline on shopping trips.

Location. A serious difficulty in cold regions is the need to travel in extremely cold weather. The distance is not as much a problem as getting dressed, starting the car, parking, loading and unloading, and keeping the car running or making sure that it can be started again. This struggle, with children, is one of the most serious problems facing the housewife. Especially difficult is the situation of the family when the husband is away and the wife must manage the entire traveling process by herself. Because of these difficulties, it would be best to arrange facilities so that the housewife could do all her shopping in one trip. Also, in regard to the location of family housing, barracks and transient housing, it would be more convenient to have all three equally accessible to central facilities than located as presently at Fort Wainwright. Ideally, this would mean a base design with the three living environments radiating around a centrally located facilities mall.

Figure 6 indicates the desired relationships in site planning. The basic concept is to organize the site around the central facilities. Included among the central facilities should be the PX, commissary, gas station, clubs, hobby shops, beauty shops, and all commercial enterprises that serve the population. It would be convenient also to locate the post office here, accessible to the work area. Such an arrangement would provide "one-stop shopping", thus alleviating much of the problem of cars, children, and excessive gas consumption. An important aspect to be contained in the central facility would be to locate the day care center there so that children can be left while wives shop or go to the beauty parlor, social events, or work.

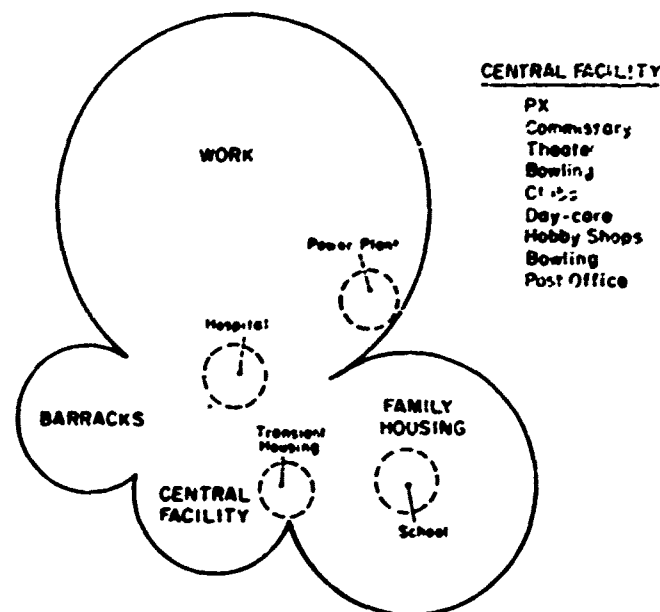


Figure 6. Schematic diagram of large installation site plan.

Around the central facility should be ranged the family housing with transient housing close by. Barracks should be located opposite family housing and on the other side of the central facility. The hospital should be equally accessible to family housing and barracks. The school should be in the center of family housing.

The work area should be more accessible to barracks than family housing because of the transportation problems of single soldiers. Transient housing should be close to family housing to enable families that are leaving the base to maintain contact with friends.

The power plant should be located in the work area to minimize the distance that utility lines travel to all locations. The orientation of the power plant should also be such that prevailing winds carry the smoke away from populated areas. Regardless of how much the effluents are reduced, the escaping vapor contributes considerably to ice fog, which is a constant factor.

Conclusions. The military environments of cold regions: 1) tend to be viewed as temporary by the residents and, as such, may not be taken as seriously as other assignments; 2) are better for personnel in small installations; and, 3) are hardest on dependents, especially the non-working wives who tend to sequester themselves at home. There is some evidence that the average person assigned to Fort Wainwright does not learn the habits necessary for life in cold regions. These elements have far-reaching consequences on both site planning and design for individual buildings.

FORT WAINWRIGHT

Fort Wainwright is the largest and most northerly Army post* in the United States. As such, it is a fitting location for a behavior setting study of cold regions conditions. It currently (January 1975) employs about 7,500 persons, including civilians and retirees. As the most northerly post, it acts with Fort Greely and Fort Richardson as the training ground for arctic warfare. Very recently its population in family housing and work settings has shifted to make room for pipeline workers.

Behavior setting surveys were made at three AC&W stations and four FAA stations for comparison with Fort Wainwright. Figures 7, 8, and 9 show the 11 action patterns and 5 behavior mechanisms at Fort Wainwright compared to the three AC&W stations and the four FAA stations.

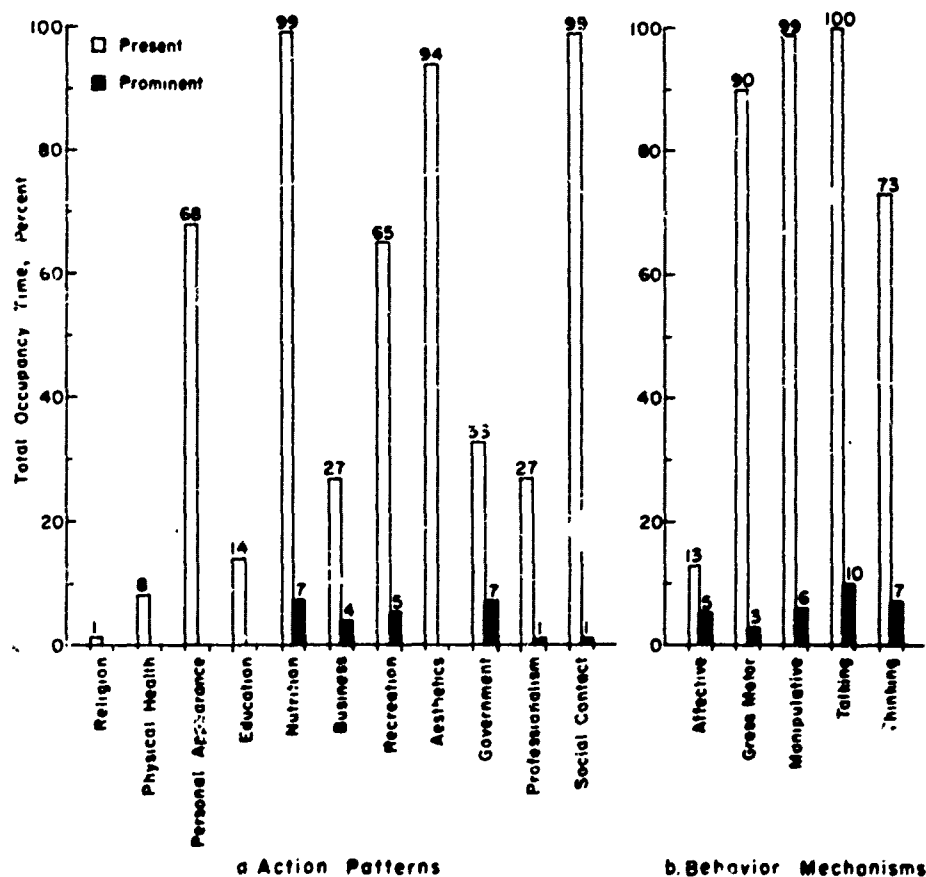


Figure 7. Action patterns and behavior mechanisms of AC&W stations.

*Actually Fort Wainwright is a subpost, which means the local commander has less autonomy and that orders come directly from higher levels.

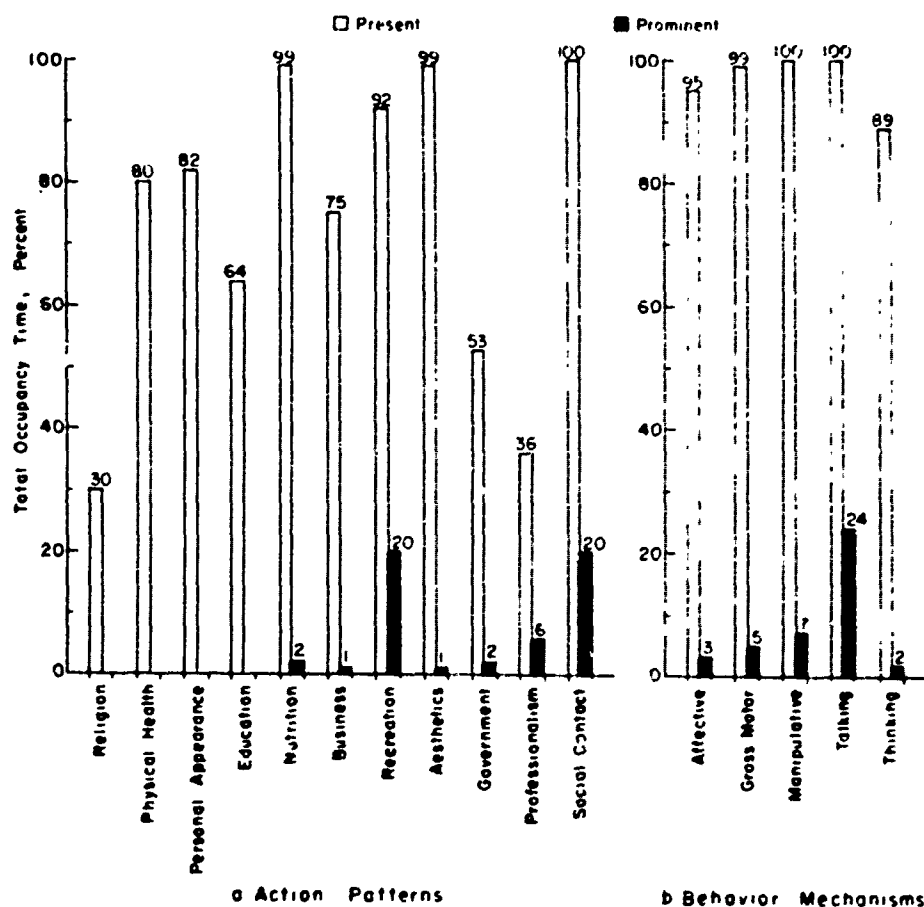


Figure 8. Action patterns and behavior mechanisms of FAA sites.

The bar graphs in these figures indicate whether an action pattern is merely *present* for a noticeable time in the settings or *prominent* in a setting. *Present* means that the activity occurred at least at trace level during the occupancy time; *prominent* means that the activity was a major part of behavior during the occupancy time. Data show percentages across the occupancy time of all settings.

As can be seen from the graphs, the *religion* action pattern is present a greater percentage of the occupancy time in Fort Wainwright than in the AC&W stations, but religion seems to play a nearly equal role at FAA stations. Part of this is because of the greater mobility of personnel at Fort Wainwright and FAA stations which facilitates association with church and church related groups. It must also be noted that the Army stresses religion much more than the FAA where religion is entirely at the discretion of the individual.

The *physical health* action pattern is present for a greater percentage of the occupancy time of Fort Wainwright than at the AC&W sites, but it is present for a smaller percentage of time than at the FAA installations. However, 1% of occupancy time at Fort Wainwright is prominently physical health, due to the existence of Bassett Army Hospital on the post.

The *personal appearance* action pattern is present for 100% of the occupancy time of Fort Wainwright but less for the FAA and AC&W sites. It is a characteristic of an Army post to be more concerned with personal appearance and other aspects of dress than the Air Force and FAA.

The *education* action pattern is present for a greater percentage of the occupancy time at FAA locations than at AC&W stations or at Fort Wainwright. This is largely because of the greater pervasiveness of on-the-job training and upgrading of FAA personnel compared to either of the military environments.

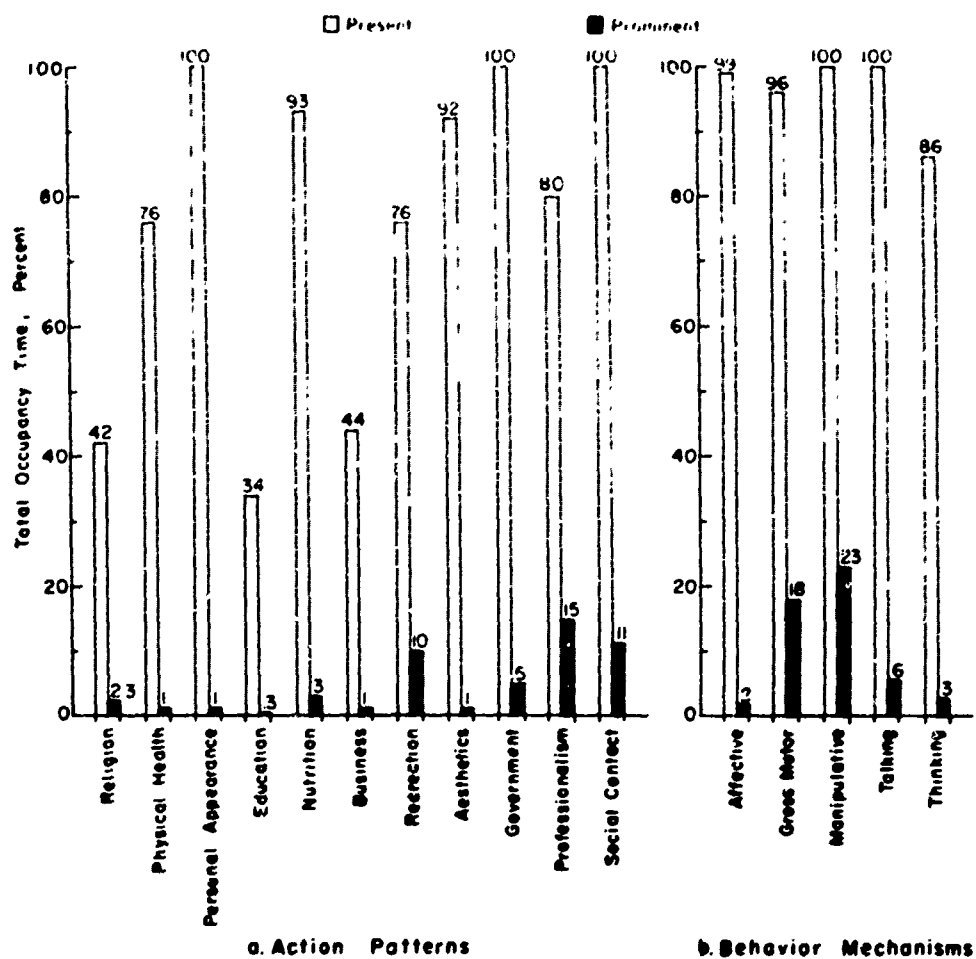


Figure 9. Action patterns and behavior mechanisms of Fort Wainwright.

The *nutrition* action pattern is highly present in all three types of environments but is more prominent in the AC&W stations.

The *business* action pattern is present for a higher percentage of occupancy time among FAA locations than for either AC&W stations or Fort Wainwright. However, business is slightly more prominent in the AC&W occupancy time. The prominent pattern is greater at AC&W sites because of the larger role the BX (Base Exchange) plays in life at an AC&W station. Business is present in more FAA settings because of greater intermingling with the local communities.

The *recreation* action pattern is both more present and more prominent in the FAA occupancy time than at either of the other two environments. Recreation is higher, both prominent and present, in Fort Wainwright than it is at AC&W stations. This is largely because of the high recreation action pattern in family housing and a higher rating in work sites at Fort Wainwright.

The *aesthetic* action pattern is uniformly present in all three environments and does not discriminate among them. All three environments are high in clean-up activities.

The *government* action pattern is more present in the occupancy time of Fort Wainwright than at the other two environments, although AC&W sites have a slightly larger percentage of prominent government action patterns than FAA sites. This finding seems to indicate a more general pervasiveness of government in life at Fort Wainwright than at the other sites.

The *professionalism* action pattern is also higher in both present and prominent percentages than either of the other two environments. This is partly due to more nonpaid salaries in settings of the other sites, such as the co-op activities in FAA and volunteer activities at AC&W stations.

The *social contact* action pattern is uniformly high as a presence in the occupancy time of all three environments but more prominent in FAA occupancy time. Social contact is also more prominent in Fort Wainwright occupancy time than that at AC&W sites. FAA stations seem to be more of a "talking" place than the other two environments and this is confirmed by the talking behavior mechanism score below.

Behavior mechanisms. Affective behavior is about equal for present and prominent scores in FAA and Fort Wainwright but seems to be much lower as a present score in AC&W stations, although slightly higher as a prominent score. There would seem to be considerably less emotional expression at the AC&W sites. Reasons for this may be that the AC&W sites are the only environment without families and family housing, and therefore, much less emotional expression is scored in the absence of wives and children.

Gross motor behavior is uniformly present in all three environments but more prominent in Fort Wainwright. The reason why Fort Wainwright may have more gross motor behavior that is prominent is that there are more construction activities on Fort Wainwright as part of the continuing scheme of behavior, as opposed to FAA and AC&W sites where construction is an event that takes place when needed and is done by outside contractors. Further, in certain settings, the gross motor behavior is made prominent because of the larger size of the post and the correspondingly longer time it takes to travel within it.

Manipulative behavior is uniformly present in all three environments but most prominent at Fort Wainwright. The reason for this is the greater percentage of clerical staff at Fort Wainwright and the greater amount of construction and repair activities which require use of the hands.

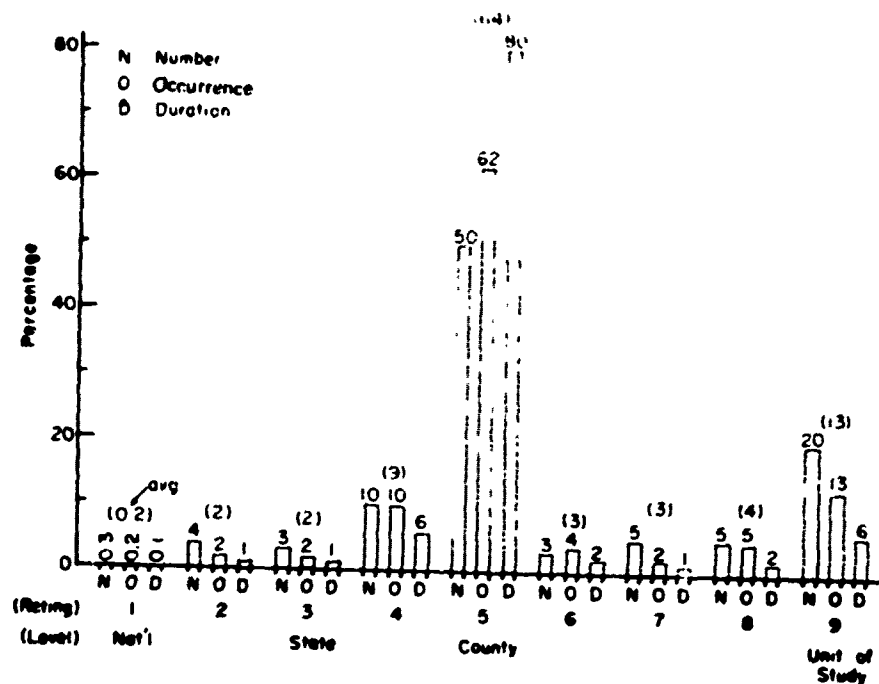
Talking is more prominent in the FAA and this corresponds with the prominent social contact score.

Thinking behavior, really decision making, is present at the highest level at both FAA locations and Fort Wainwright, indicating the AC&W stations have less pervasive decision making than the other two environments.

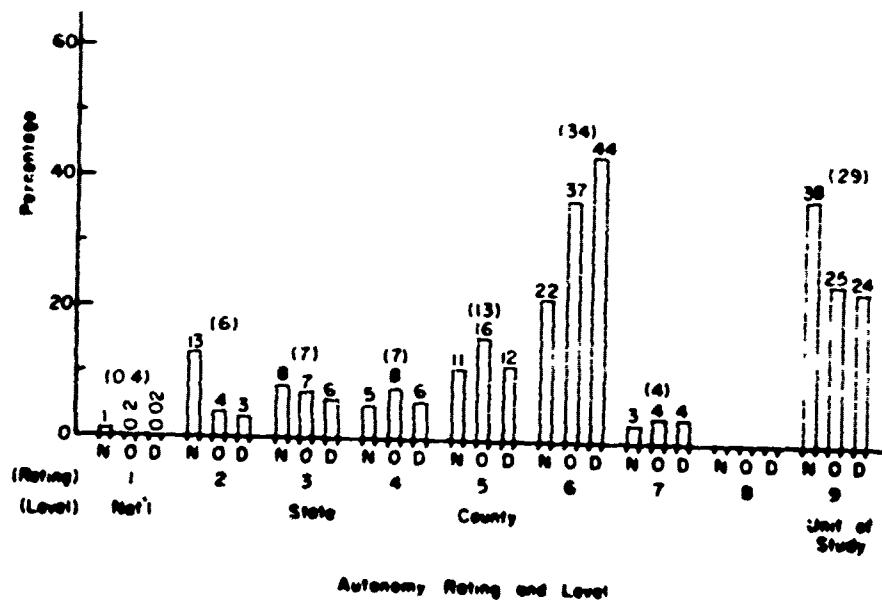
Other measures. Autonomy is the rating of how much each environment is able to determine its own affairs. Figures 10, 11, and 12 show the distribution of autonomy scores for the three environments. Clearly, the most autonomous sites are the FAA sites with a mean of 6.1, followed by the AC&W stations (5.8) and Fort Wainwright (5.7). The two military sites are quite close in score, and FAA, being a government organization, is not that much higher than the military sites. In fact, it is clear from Figure 11 that the distribution of FAA scores is more bimodal than the other environments. Those settings scoring at a level of 6 are the monthly, semi-annual, and annual service checks and inspections programmed by government rules. The higher scores are the family settings and other more autonomous work settings.

Isolation. Table VIII shows the percentage of (I or Incurive) behavior settings that originate off site but come onto the site, the number that originate on site but go off site (E or Excursive), and the number that originate and stay on site (O).

From the data in Table VIII it is apparent that the FAA stations are the least isolated of the three environments, with 21% of their occupancy time being taken up with either incurive or excursive settings. One possible bias in these data is that *all* sites studied were near a town. The AC&W stations had Fairbanks, Galena and Kotzebue within travelling distance and the FAA stations all had towns nearby. Fort Wainwright is next to Fairbanks. Therefore, the data reflect *only relative isolation when a town is near*.



Autonomy Rating and Level
Figure 10. Fort Wainwright autonomy levels.



Autonomy Rating and Level
Figure 11. FAA autonomy levels, with percentage totals for number N, occurrence O, and duration D.

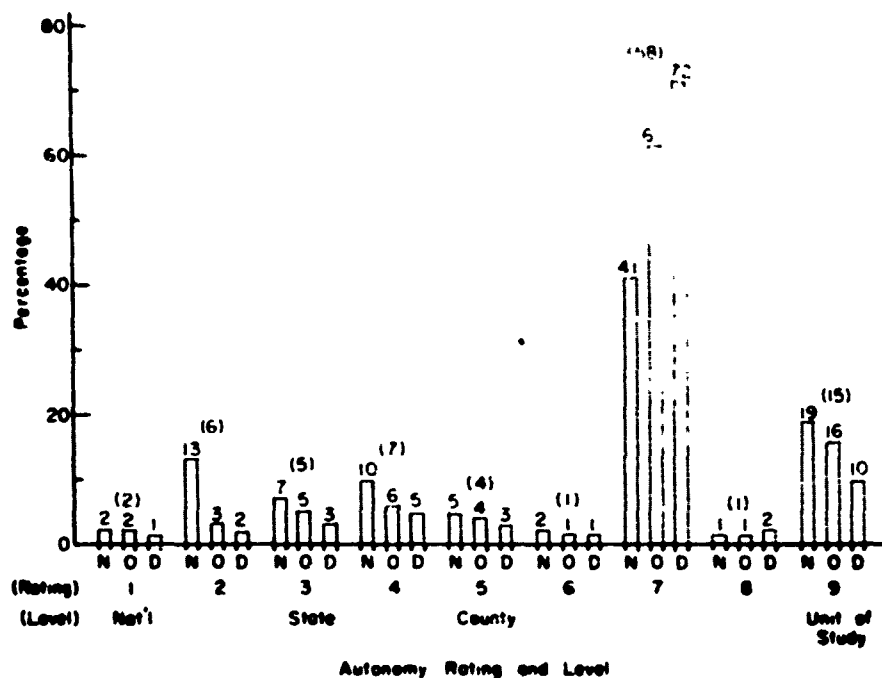


Figure 12. AC&W sites autonomy levels with percentage of totals for number N, occurrence O, and duration D.

Table VIII. Number and percentage of excursive, on site and incursive settings for three environments.

	Excursive settings		On site settings		Incursive settings	
	N	%	N	%	N	%
Fort Wainwright (without Bassett Army Hospital)	26	2	1,117	96	22	2
FAA	15	7	164	79	28	14
AC&W	22	3	750	86	96	11

Also, the data are correlated with size of installation. Obviously an inspector general's visit takes up a greater percentage of behavior settings at a post with 100 men than it does at a post with nearly 8,000. But at the same time this means that larger posts, by this measure, must exercise greater efforts to move personnel off post for recreational or other purposes. This is a further reflection of the problem of size of installation discussed earlier.

Therefore, isolation at these sites, as measured by number of settings that either originate onsite and go off, or originate offsite and come on, is intimately related to size of installation.

Varieties of behavior is a measure of behavioral resources. Usually varieties are measured by the number of different genotypes in an environment. Table IX shows the numbers of behavior settings discriminated, the numbers of genotypes discriminated, and the ratio of settings to genotypes.

Obviously the number of varieties of behavior at Fort Wainwright is higher than the number of varieties at either the FAA sites or the AC&W stations. The number of settings per genotype is also higher at Fort Wainwright. Thus, the choice of varieties within varieties (so to speak) is even higher. This is one of the advantages of larger installations and is consistent with previous findings (Barker 1968, Barker and Gump 1964).

**Table IX. Behavior settings and genotypes
(varieties of behavior) in three environments.**

<i>Environment</i>	<i>Number of settings</i>	<i>Number of genotypes</i>	<i>Ratio S/G</i>
Fort Wainwright	1,586	623	2.55
FAA	204	118	0.17
AC&W	870	423	2.06

Penetration level, one of the most critical measures of the environment, is the number of leadership roles available to the population. This can only be determined by dividing the environment into behavior settings because each setting defines leadership roles.

The ratio of performers to population at the AC&W stations is 0.65, for FAA 0.45, and for Fort Wainwright 0.31. These three figures show a descending order of participation in leadership for the three environments. This type of measure can also be used as a rough index for undermanning, showing that the AC&W stations are more undermanned than the other two environments.

General richness indices for the three environments show FAA has a mean index of 11.07 for all settings, Fort Wainwright 12.06, and AC&W 7.96. The indices are influenced by the presence of families at FAA and Fort Wainwright, making these richer environments than the AC&W stations which are almost entirely male.*

Conclusions. Fort Wainwright shows the characteristic Army profile of higher presence of religion action pattern, higher presence of personal appearance action pattern, high presence of government action pattern, and higher presence of professionalism action pattern. Fort Wainwright also seems to be an environment that is more physically active than the other two environments.

Profile comparisons of behavior setting data - civilian environments not in cold regions

The non-cold region environments which will be compared to Fort Wainwright are those previously studied by behavior setting surveys: the small town in Barker's Midwest (Barker and Wright 1955, Barker 1968, Barker and Schoggin 1973); the poor white and black residential areas reported in Bechtel, Achelpohl, and Binding (1970), and the ARROWHEAD project, an all black public housing estate in Cleveland, Ohio (Bechtel 1971, 1972).

There are several reasons why these environments are not strictly comparable to Fort Wainwright. First, not all of the areas of life in Fort Wainwright were studied. For example, schools were left out of the behavior setting survey. This would automatically lower the education action pattern for Fort Wainwright. Second, the small town, Midwest, is the only complete community of the five environments. The two urban residential areas did not contain churches, schools, and other community institutions. ARROWHEAD is similarly lacking in these institutions. Third, Fort Wainwright and the two residential areas contain family behavior settings while ARROWHEAD and Midwest do not. It is not certain how this influenced the data, but it may have made Fort Wainwright seem richer (higher GRI) than the two environments without family settings. Nevertheless, if these limitations are kept in mind, a profile comparison can be instructive in how Fort Wainwright differs as an environment from the other four.

Action patterns. If Fort Wainwright, incomplete as its behavior setting data are, is compared to civilian environments not in cold regions, some of its peculiarities as an environment may be further highlighted. Table X shows how the Ecological Resource Indices (ERI)[†] of four civilian environments compare with Fort Wainwright.

*There was one female secretary at Murphy Dome and another female secretary at Kotzebue. All other personnel were male.

[†]ERI scores stand for Ecological Resource Index (Barker 1968, p. 107-109). This is an average percentage of number, occurrence, and duration of behavior settings. Barker feels it is an indicator of the availability of a certain action pattern in the environment. Data are for present scores only. The ERI should not be confused with the General Richness Index (GRI). See Appendix A for a further description of the ERI.

Table X. Comparison of Fort Wainwright with four civilian environments not in cold regions as to ERI scores (in percentages) for action patterns.

<i>Action patterns</i>	<i>Small town (Midwest)</i>	<i>Poor white city residents</i>	<i>Poor negro city residents</i>	<i>ARROWHEAD</i>	<i>Fort Wainwright</i>
Religion	15-17	15-17	15-17	2	50
Physical health	22	23	23	83	76
Personal appearance	99	74	97	99	84
Education	37	7	21	47	17
Nutrition	55	85	80	67	91
Business	62	49	49	53	27
Recreation	62	88	52	85	70
Aesthetics	70	81	44	58	88
Government	70	65	64	70	97
Professionalism	87	59	67	80	79
Social contact	100	100	99	78	99

As can be seen from Table X, *religion* is much more present in the Fort Wainwright environment than in any of the others by a factor of nearly three. Once again, the *religion* action pattern stands out as a defining quality of the military environment, particularly of the Army.

Physical health is more present in Fort Wainwright than in any environment except ARROWHEAD. The reason for the high rating in ARROWHEAD was the number of special programs there.

Personal appearance is a surprise when one considers how high Fort Wainwright ranked compared to the other cold regions environments. Compared to the four civilian non-cold regions environments, Fort Wainwright is just above the poor white residential block. Therefore, a high *personal appearance* action pattern could hardly be considered typical of military everywhere. The low rating is, no doubt, because of the fact that uniforms are considered as work clothes.

Education is also rated next to lowest at Fort Wainwright among the five environments compared. This is probably because the educational institutions of Fort Wainwright were not measured.

Nutrition is highest for Fort Wainwright of all environments compared. This is undoubtedly for two reasons. All organizations studied at Fort Wainwright had their coffee urns and coffee breaks as an influence on nearly every setting. Also, the mess halls and dining rooms of the military environments contrast to the lack of restaurants and equivalent eating places in the other environments.

The *business* action pattern is lowest for Fort Wainwright of the five environments compared. This is to be expected for a military base where salesmen are restricted and where much of the buying and selling takes place off post.

The *recreation* action pattern for Fort Wainwright is about average compared with the other environments. This means that Fort Wainwright would appear to be neither lacking nor outstanding in recreational pursuits when compared with the civilian environments.

The *aesthetics* action pattern is highest in Fort Wainwright, compared to the other four environments. This rank would fit with the military profile of cleanliness described earlier.

The *government* action pattern is also of highest rank in Fort Wainwright compared to the other four environments. This is to be expected in a government military post.

The *professionalism* action pattern is also fairly high in Fort Wainwright compared to the other environments, but not as high as for the small town. This is largely because the small town was a

county seat and had a large number of offices for such a small community. ARROWHEAD had as much professionalism as Fort Wainwright, because of the number of maintenance men and the presence of a settlement house containing social workers.

The *social contact* action pattern is high for all environments except ARROWHEAD. Fort Wainwright would appear to be equal in this regard to the average civilian community.

Behavior mechanisms. Table XI shows the Ecological Resource Index scores for the behavior mechanisms of five environments.

Table XI. Comparison of Fort Wainwright with four civilian environments not in cold regions as to ERI scores for behavior mechanisms.

<i>Behavior Mechanism</i>	<i>Small town (Midwest)</i>	<i>Poor white city residents</i>	<i>Poor negro city residents</i>	<i>ARROWHEAD</i>	<i>Fort Wainwright</i>
Affective behavior	56	98	77	82	96
Gross Motor behavior	70	91	91	83	89
Manipulation	79	100	100	96	99
Talking	93	100	98	95	99
Thinking	80	92	86	66	82

Affective behavior seems about equally high for Fort Wainwright and the poor white residential block. This makes Fort Wainwright high in emotional expression as an environment. One of the reasons for this high score may be the inclusion in the research data of family settings (only public settings were measured at the other four environments).

Manipulation seems to be high among all of the environments except the small town.

Talking would seem to be uniformly high among all the environments.

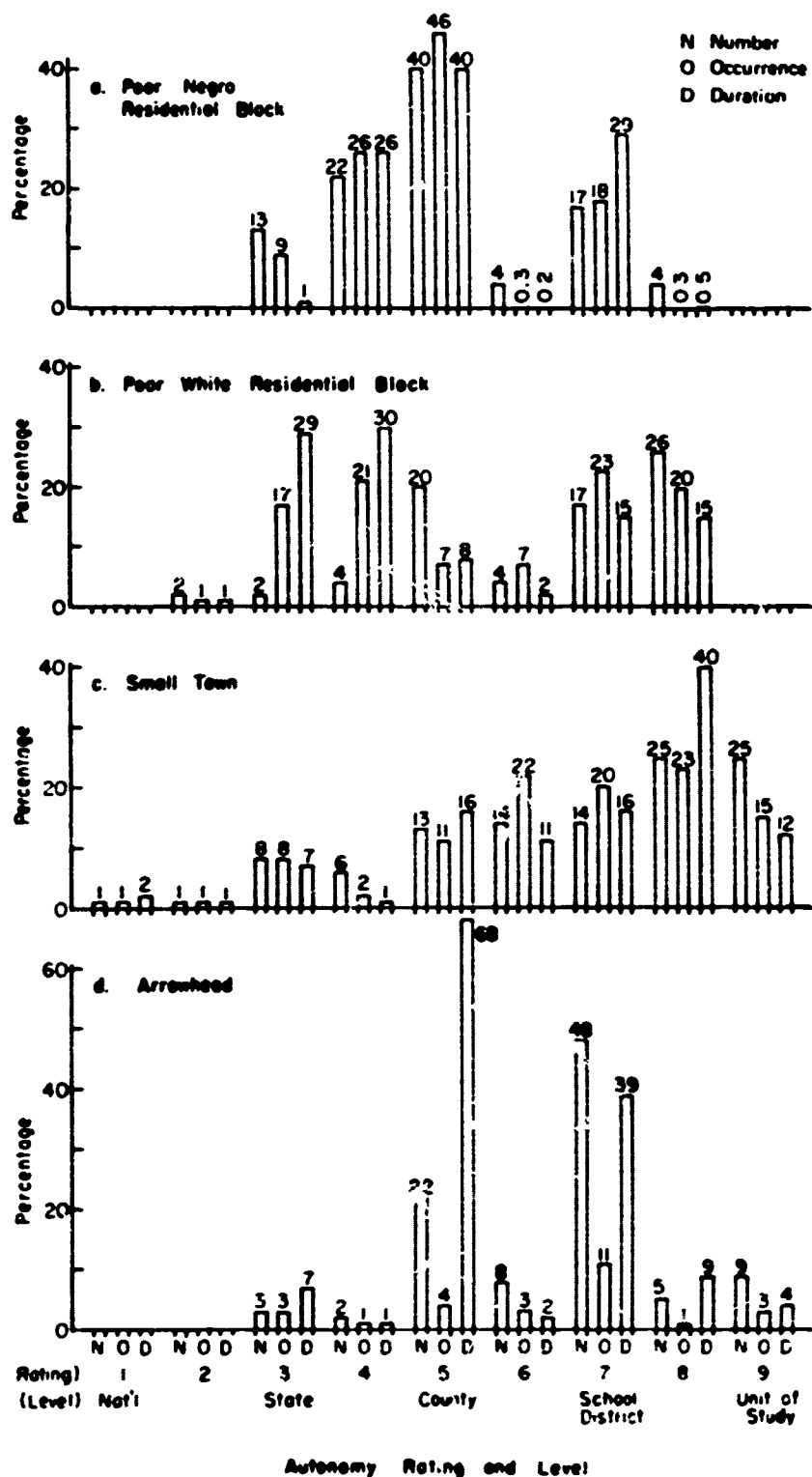
Thinking is lowest in ARROWHEAD but not too dissimilar among the other environments.

Other measures. Figure 13 shows the distribution of *autonomy* scores among the five environments. Fort Wainwright seems to have most of its scores (80% of duration) at the 5 level. Again, it must be noted that since Alaska has no county government (level 5) this represents a mathematical average.

The autonomy score is important diagnostically. Since ARROWHEAD, which has 68% of its duration at the 5 level, was termed a *dependent* environment, then the 80% duration score of Fort Wainwright would indicate more extreme dependence. This score reflects the fact that Fort Wainwright is only a subpost and that decisions are made at levels above the local commander and that, after all, this is what one would expect at a military subpost.

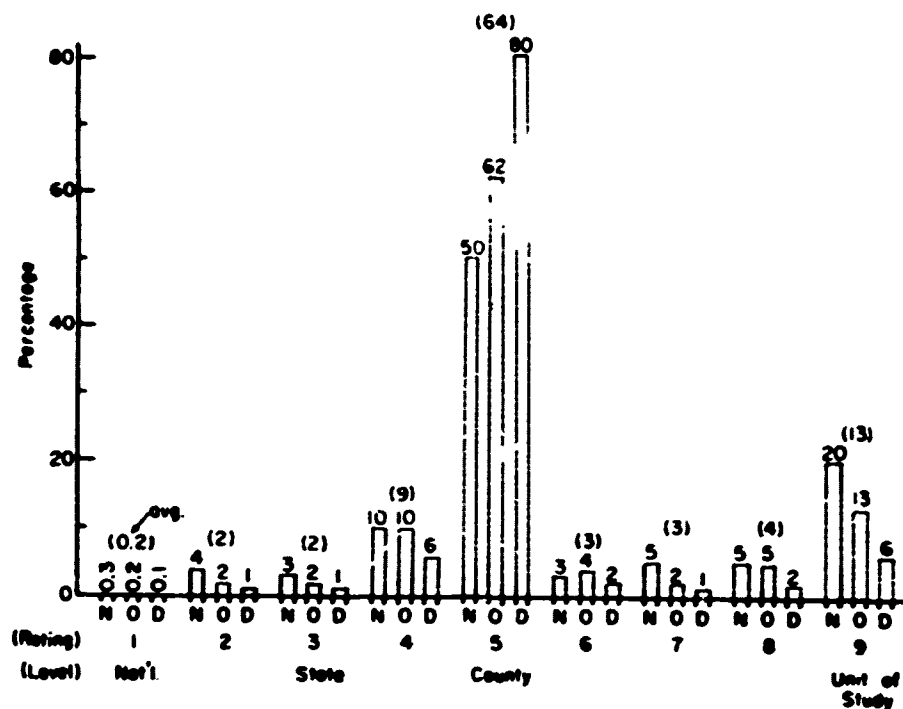
GRI scores reflect the fact that presence of families and different races makes Fort Wainwright (12.06) a richer environment than the public settings measured in the black public housing environment of ARROWHEAD (8.54), poor white residential block (7.88), or the poor black residential block (5.19).

Conclusions. The "military" profile of Fort Wainwright stands out as being high in religion, aesthetics, and government action patterns when compared to other non-cold regions environments. The high personal appearance rating that was in contrast to the other Alaskan environments did not hold up when comparisons with non-cold regions civilian environments were made. Fort Wainwright stands as the most dependent environment measured so far, due to the military structure of its autonomy.



a. Civilian environments not in cold regions.

Figure 13. Comparison of autonomy ratings with percentage of totals for number N, occurrence O, and duration D at five sites



Autonomy Rating and Level

b. Fort Wainwright.

Figure 13 (cont'd). Comparison of autonomy ratings with percentage of totals for number N, occurrence O, and duration D at five sites.

AIRCRAFT CONTROL AND WARNING (AC&W) STATIONS

Three AC&W stations were studied: *Campion*, near the Air Force Base and town of Galena (Fig. 14), *Kotzebue* (Fig. 15), and *Murphy Dome* about thirty miles from Fairbanks (Fig. 16). Three sites were originally selected as representative of the types of AC&W bases in Alaska,* but resources did not enable a study of any of the AC&W southwest sites (Cape Newenham, Cold Bay, King Salmon, Shemya). Therefore, the study sites are not representative of these southwest locations.

This study did not include AC&W stations as a central part. These stations were used more as comparisons to Fort Wainwright; hence, the data and detail of recommendations are less comprehensive.

Action patterns. Action patterns of AC&W sites were already compared to those at Fort Wainwright. A brief recapitulation will be given below.

AC&W stations are lowest in *religion* action pattern, *physical health* action pattern, *personal appearance* action pattern, *education* action pattern, *business* action pattern, *recreation* action pattern, *government* action pattern, and *professionalism* action pattern. In fact, of the three environments, they have the lowest profile. Their only distinction from the other two environments is a slightly more prominent *nutrition* action pattern. What is the reason for this low profile? Undoubtedly it is the lack of families. The chief difference between the AC&W stations and Fort Wainwright and the FAA sites is that families live in the latter two.

*See Ledbetter, C.B., and R.B. Bechtel (1974) USACRREL Internal Report 411 (unpublished).



Figure 14. Campion AC&W Station.

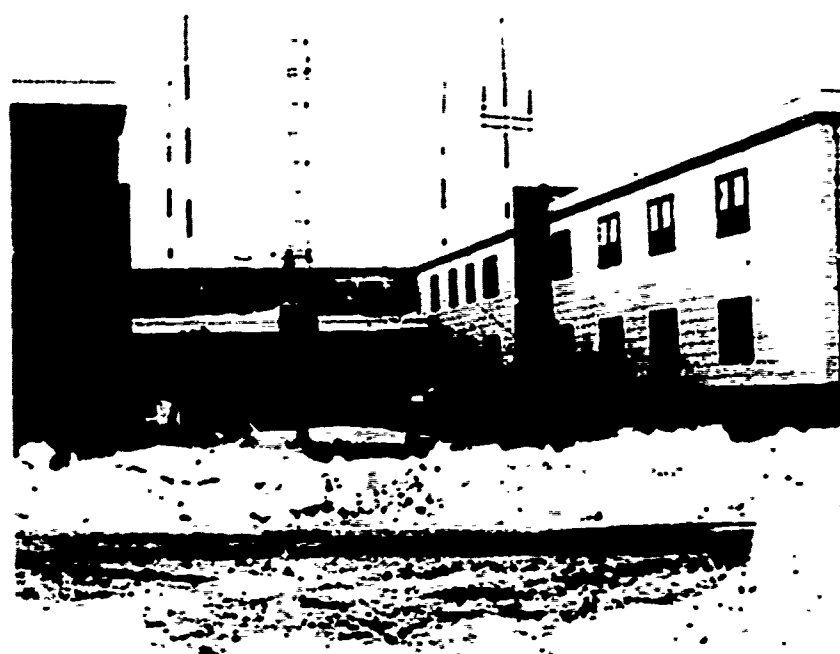


Figure 15. Kotzebue AC&W Station composite building.

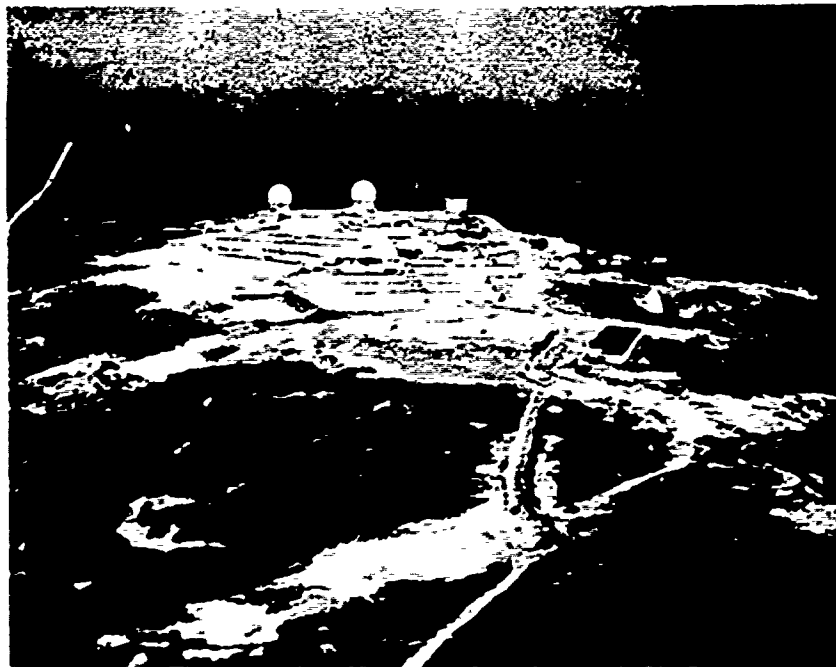


Figure 16. Murphy Dome AC&W Station.

Behavior mechanisms. The behavior mechanism scores are also given in Figures 7, 8, and 9. AC&W stations are notably lower in *affective behavior* and generally only slightly lower than the other two environments in the remaining behavior mechanisms. The probable reason for this difference is, again, the lack of families which generally score high in affective behavior.

Other measures. *Autonomy* levels of the three environments are given in Figures 10, 11, and 12. The three environments do not differ markedly, but AC&W stations and Fort Wainwright, being military, have nearly the same mean level, 5.8 and 5.7 respectively.

Isolation is measured by data in Table VIII, showing the AC&W stations not as isolated by these measures as Fort Wainwright. However, since none of the remote AC&W stations were measured and the three surveyed were near towns, these data do not represent a true picture of AC&W stations in general.

Penetration levels are measures of leadership. The AC&W stations show the highest performer to population ratio (0.65, compared to 0.31 for Fort Wainwright and 0.45 for FAA sites) demonstrating that most (65%) of the population have leadership roles in the settings. Since this is a rough measure of undermanning, it may account for the high "success" of AC&W stations in keeping down personnel problems compared to larger bases.

The *general richness* of the AC&W stations is the lowest of the three environments (7.96 compared to 12.06 for Fort Wainwright and 11.07 for FAA sites). Once again, the lack of families is apparent in this measure.

Conclusions. The AC&W stations are an all-male environment. One could assert that this should not make a critical difference from the family environment. Yet, in 8 of 11 action patterns, in emotional expression (affective behavior) and in general richness, the behavioral resources available to personnel are lower. What seems to compensate for this lack of behavioral resources in so many areas is a very high level of responsibility and leadership opportunity.

Observations and synomorphic analyses of A-C&W sites

Tunnels vs composite building. The issue of whether to have AC&W stations designed as large composite buildings (see Fig. 17) or as separate buildings connected by tunnels (see Fig. 18) was raised in an earlier report. Present data do not allow a definitive resolution to this problem and further research needs to be done. However, since the trend in design of future stations is toward composite buildings, *the assumption of this report is that this trend will continue.* Hence, recommendations might need to be modified if future data are collected.

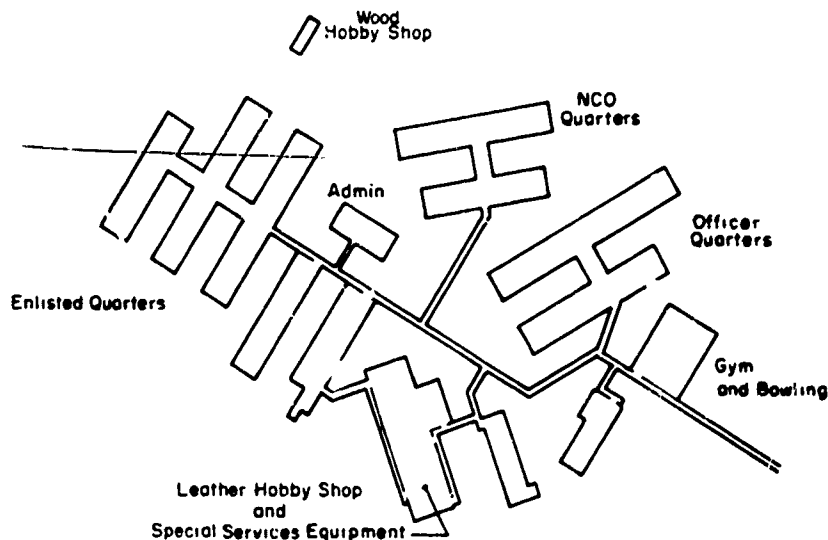


Figure 18. Murphy Dome site plan.

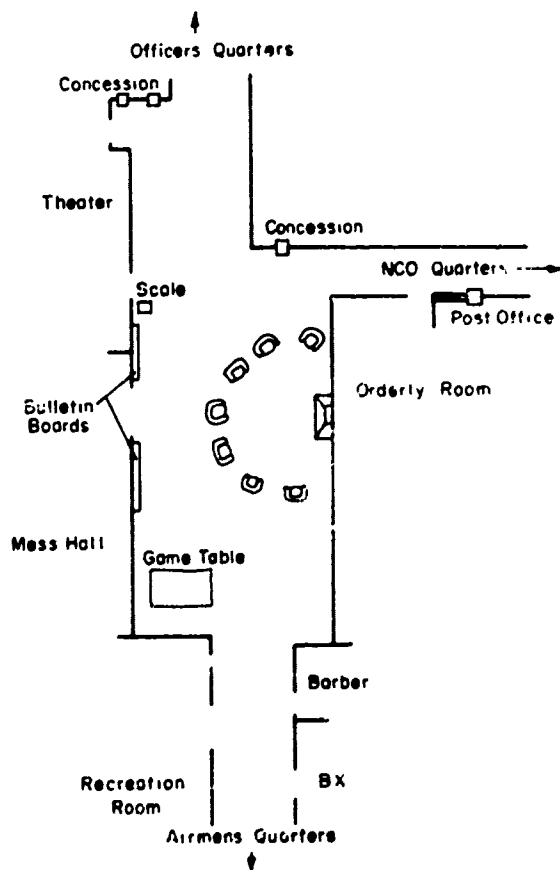


Figure 19. Cape Lisburne light well.

Site planning. A second issue raised in the earlier report (Bechtel 1974) was that of organizing the site plan around a central focal point* where all ranks and sections would come in contact with one another. Figure 19 shows a natural focal point that developed around the light well area at Cape Lisburne AC&W station. Note that the location has all the features of a focal point. Three main travel arteries intersect there, and necessary and casual functions border on it, allowing a certain amount of spillover. It does not limit participation by being part of some institution or other function.

What is important about focal points is that, in a highly structured organization like a military station or government bureaucracy, they foster informal contacts which help to get the formal business done through informal channels. Thus, the efficiency of a formal organization is improved by encouraging informal contact.

AC&W stations in all cases have attempted to make officers' clubs and NCO Clubs their focal points. They have failed when site planning did not take accessibility into account and they have succeeded when the intended focal points were placed at important travel junctures.

Figures 20, 21, and 22 illustrate this point from data collected at the three AC&W stations.

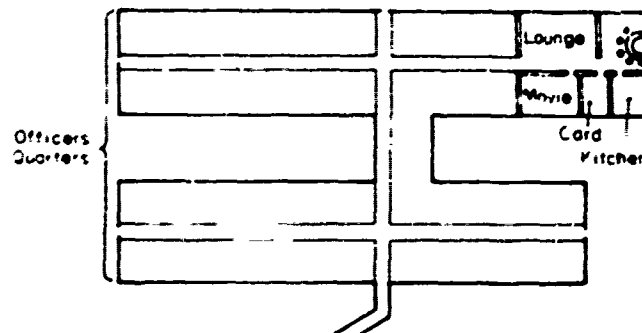


Figure 20. Station 1 officers' club location

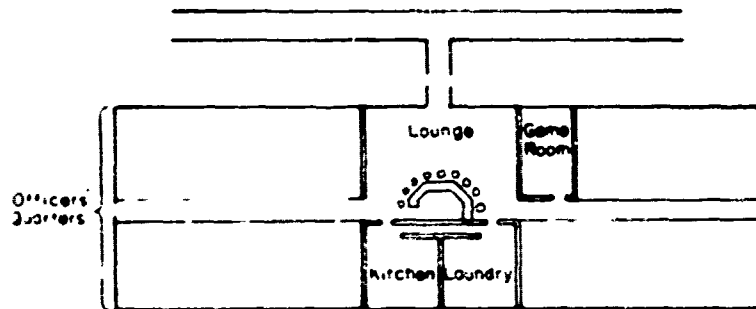


Figure 21. Station 2 officers' club location.

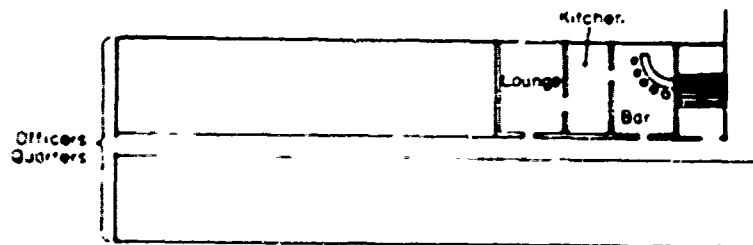


Figure 22. Station 3 officers' club location.

* A focal point is a behavior setting in a community usually located at the juncture of the main travel routes where the greatest number and variety of people can gather informally. It has high accessibility to adults, adolescents, and children and does not limit participation. In small towns it is often a drugstore.

Figure 20 shows an officers' lounge at the end of a building which houses officers in a two building cluster off the main travel artery. Figure 21 shows an officers' club at the juncture of three corridors which is situated such that one must pass through the lounge to get into any officer's quarters. Figure 22 shows an officers' club on the second floor of an officers' quarters near a stairway going upstairs.

Normally, one would think that the use of these lounges would depend on the number of officers and guests available to use them. Table XII, however, shows that the lounge in Figure 21 gets the most amount of use even though the station has a smaller population than the station with the lounge in Figure 20. The lounge in Figure 22 was a virtual failure as a club, not only because of

**Table XII. Utilization of officers' lounges at three stations
(from Ledbetter 1974).**

	Station 1	Station 2	Station 3
Design Factors	End of Corridor	Junction of 3 Corridors	Upstairs along Corridor
No. of settings	5	2	6
Occupancy time (man hours/yr)	10,152	17,090	816
Population of settings	14	10	4
Setting/population ratio	0.357	0.20	1.5

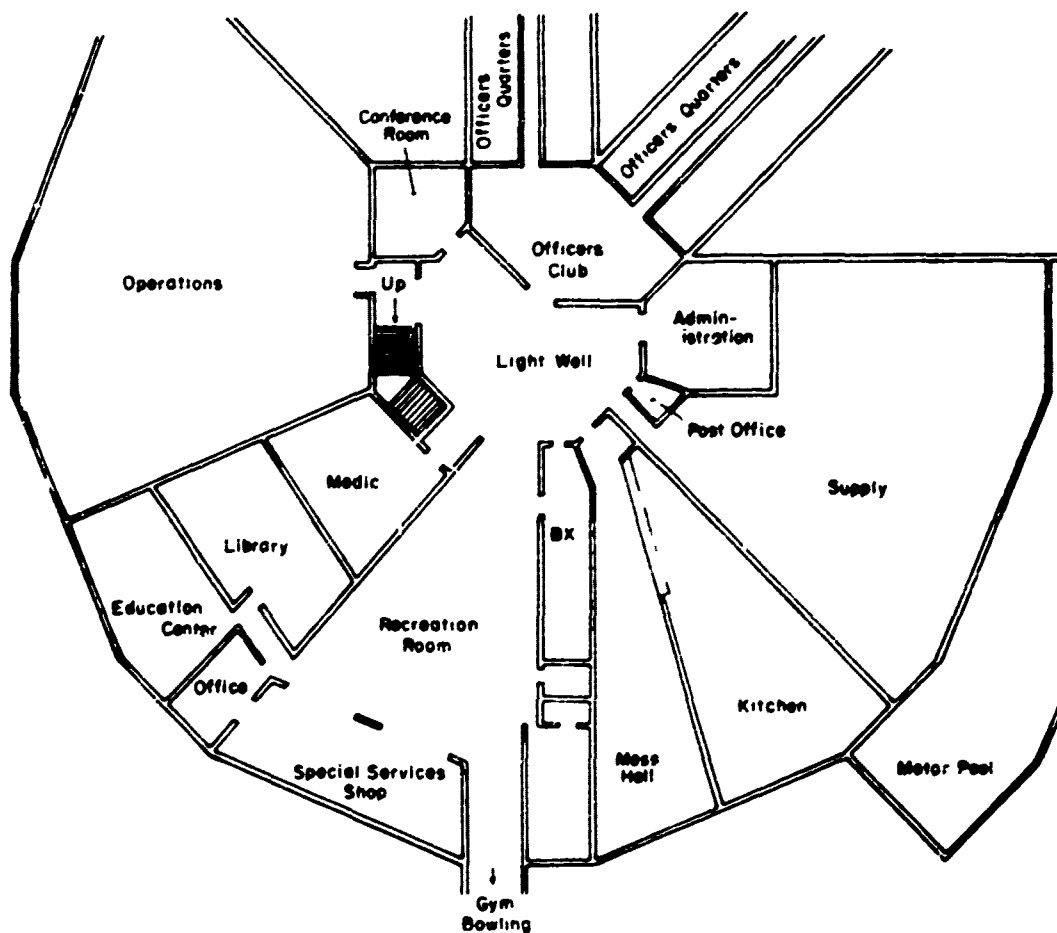


Figure 23. First floor core of a suggested AC&W composite building.

its low potential population but also because of its poor location. It was used so infrequently that meetings of various groups were held there in order to make use of the space. The lesson that lounges must be designed carefully is clear if one wants to assure maximum use of lounge space.

Design recommendations. Figure 23 shows the first floor core of a suggested AC&W composite building. The design is planned around a central focal point at the intersection of all main corridors. Several mini-focal points are auxiliary to the central one, such as the mini-focal point at the recreation room.

The functions adjoining the central focal point, the conference room, officers' club, and orderly room assure that the upper echelon officers will be exposed to the informal environment of the focal point.

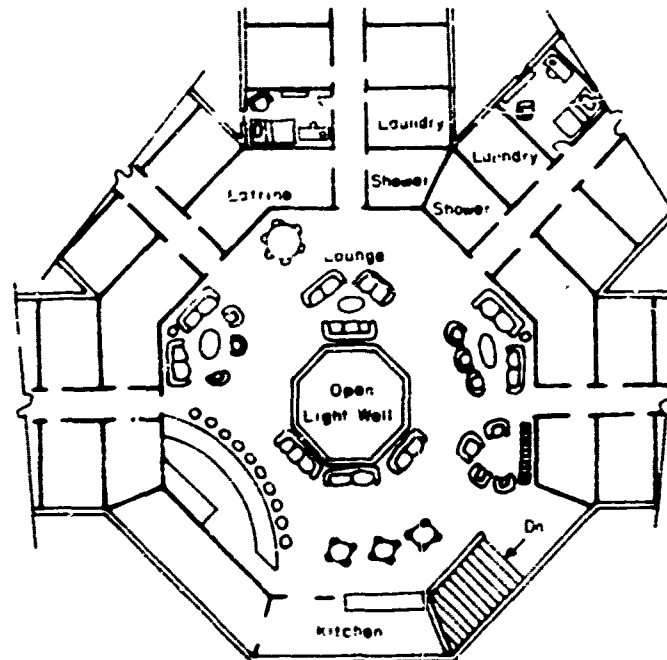


Figure 24 Suggested second floor arrangements for an AC&W station

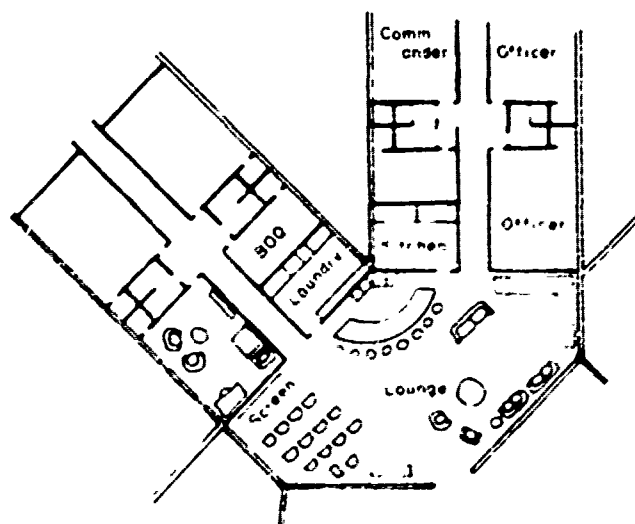


Figure 25 Suggested floor plan of officers' lounge at a railway station

For those sites that are supplied by cool barge (where one year's non-perishable supplies are delivered at one time per year), vehicles can be moved out of the motor pool and the garage can be used as a staging area for the supplies until they are disseminated.

The civil engineering (CE) function (not shown) should be in a separate building. Observation demonstrated that when the maintenance men had to "suit up" for the cold in order just to go to work they were more willing to do outside maintenance than if the CE facility were indoors.

Figure 24 shows the suggested second floor arrangements for an AC&W station. Although this depicts a straight corridor arrangement for dormitories, the cluster design as shown in the barracks for Fort Wainwright is more preferred. The second floor also has hallways intersecting at a club (following the relevant findings). Since single rooms were much preferred by AC&W personnel, as well as by soldiers at Fort Wainwright, the dormitory rooms are designed in this way.

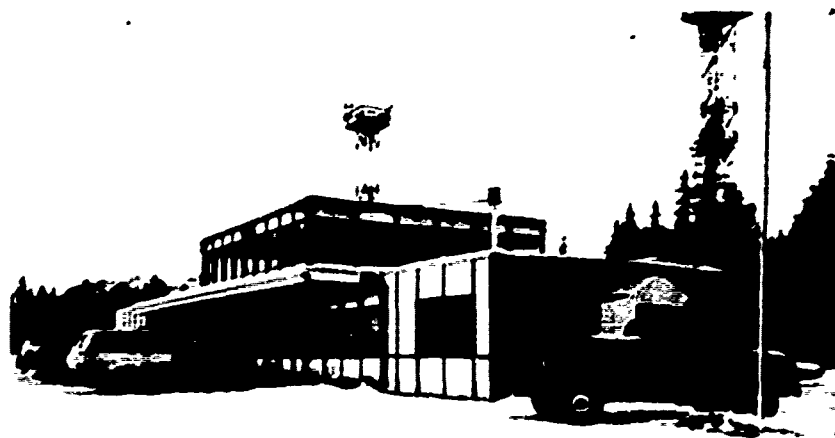


Figure 26. Cordova flight service station building.



Figure 27 FAA housing at Gulkana, typical of housing at FAA sites.

Figure 25 shows the arrangement of officers' quarters and lounge. It should be noted that these designs provide for a window in every room. Whether each room actually needs a window is a subject for future research.

The design shown in Figures 23-25 is nothing more than a demonstration. Such a design could *not* be constructed as shown because of snow drifting. Further research is needed to determine how a design of intersecting corridors could be built that would alleviate this problem.

Other scores. *Autonomy* is highest for FAA sites, probably because they are run by a non-military agency. Even so, the score (6.1) is not significantly higher than AC&W stations (5.8) or Fort Wainwright (5.7).



Figure 28. Flight service station and weather bureau buildings at Kotzebue.

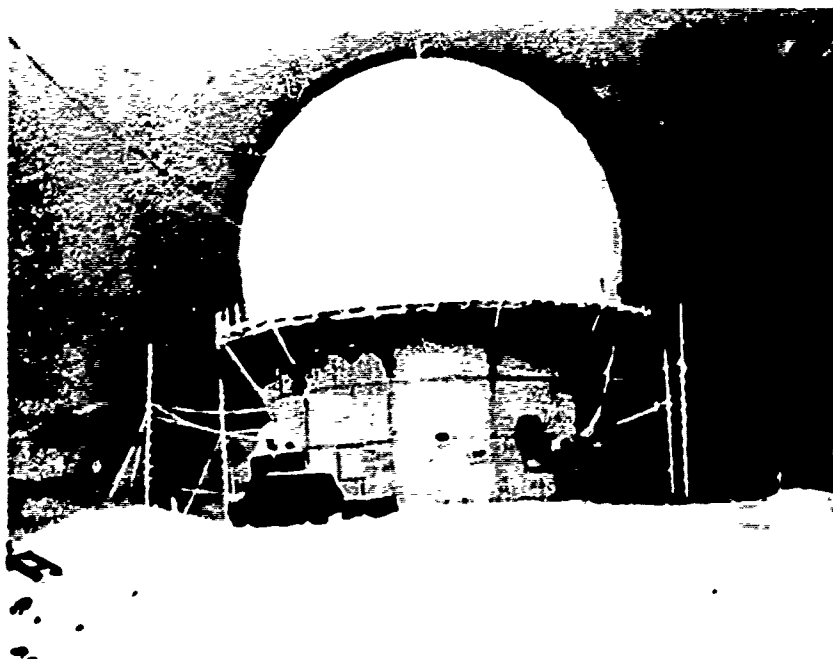


Figure 29. FAA-operated radar tower at Murphy Dome.

FEDERAL AVIATION ADMINISTRATION SITES (FAA)

Four Alaskan sites with FAA activities were studied: Cordova, 15 miles from the town of Cordova (Fig. 26); Gulkana, 10 miles from the town of Glennallen (Fig. 27); Kotzebue, next to the town of Kotzebue (Fig. 28); and Murphy Dome, located next to the Murphy Dome AC&W and about thirty miles from Fairbanks (Fig. 29).

Of the six types of FAA sites in Alaska, these sites represent four (Murphy Dome-Central FAA, Gulkana-FAA with dependents, Kotzebue-Middle FAA, and Cordova-South Coast FAA). FAA types not represented are the Low Latitude FAA and the Middle FAA, type II (see Ledbetter and Bechtel 1974 for complete description of types).

FAA sites are associated either with air fields or operating airplane navigational devices.

Profile comparisons with other cold regions environments. The data on action patterns and behavior mechanisms for FAA sites, in comparison with AC&W stations and Fort Wainwright, were presented earlier. Only a brief recapitulation will be given. Considering present scores, the FAA sites are highest in *physical health, education, business, recreation, and aesthetics* action patterns; in prominent scores, the FAA sites are highest in the *social contact* and *recreational* action patterns. In general, this makes the FAA a more sociable and more recreative environment than the other two environments. These aspects may be influenced by the fact that the FAA sites are the smallest environments in population (averaging about 10 families each) of the three environments studied. Barker's (1968) undermanning theory predicts that members of undermanned environments will be more valued and have better identity than those of overmanned environments, and this may lead to greater social contact. The greater participation of smaller populations in recreation has already been discussed.

Behavior mechanisms. The behavior mechanism scores were also listed earlier. The most outstanding difference of the FAA from the other two environments is in the larger score in the *talking* behavior mechanism as a *prominent* score. This is partly because one of the largest work settings, the flight service operations room, involves talking with aircraft via radio, issuing weather reports, giving pilot briefings, and even serving as a social gathering place. All of these activities have talking as a prominent behavior mechanism.

Isolation scores (as shown in Table VIII) list the FAA as the least isolated of the three types of environments compared, although, as was mentioned before, none of the environments studied was truly isolated in the geographical sense. As can be seen from the scores, FAA personnel interact more with the local communities than the other two environments.

Penetration levels for FAA (0.45) are intermediate between AC&W (0.65) and Fort Wainwright (0.31) when calculated as a performer/population ratio. This indicates leadership opportunities are not as available to FAA personnel as they are at AC&W sites, but seem to be more available than at Fort Wainwright.

The *general richness* of both FAA sites and Fort Wainwright is high in comparison with AC&W stations (11.07, 12.06, and 7.96 respectively) because of the presence of families.

Conclusions. The FAA environment seems the best of all three environments in terms of behavioral resource measures. It is the least temporary, is fairly undermanned, is nearly equal in richness to the vastly more populous Fort Wainwright, and is the least isolated. It was not the purpose of the study to analyze FAA sites for design aspects, so no recommendation will be given. However, many FAA personnel communicated the concern that FAA administration "wanted to get out of the housing business." If this would in any way jeopardize the presence of FAA families on site, it would be a serious mistake. One of the facts clearly shown by the data of this report is that the presence of families, despite the problems caused, is the greatest single resource in the cold regions environment.

PART III. THE TEMPORARY ENVIRONMENT OF FORT WAINWRIGHT

FAMILY HOUSING

Family housing was selected as a primary goal of habitability research since the largest single block of time of both military personnel and their dependents is spent in the home. Further, resources, in terms of construction, furnishings, housing allowances, maintenance and other services are far more costly for families living on post than any other classification of personnel. Psychologically, there is reason to believe that the well-being of the family on post is one of the most significant factors in the performance and retention of military personnel.

Methods of study

Fort Wainwright had about 1300 families living on post at the time of the behavior setting survey. Of these, 1145 were in nontransient housing and 185 were in transient housing. It was decided to do a random sample of the families in nontransient housing to collect behavior setting information and ask direct questions about the habitability of quarters. The questionnaire and results are presented in Appendix B.

The use of a questionnaire to collect behavior setting information is considered a methodological innovation. Previously most behavior setting data have been collected by a costly series of observations taking a year (see M. Brewster Smith's (1974) criticism of this time-consuming process). The questionnaire technique permitted data gathering within three weeks' time.

In addition to the questionnaire, Project Officer C. Burgess Ledbetter and his family (Fig. 30) lived on post in family housing for 11 months. This permitted his direct observation of the behavior and many of the problems in family housing. This second source of data served to validate questionnaire responses.



Figure 30. C.B. Ledbetter and family lived in post housing. Children's ages are 5 years and less than 1 year.

Observation in the context of this study consisted of identifying *synomorphs*, behavior environment links (see Barker 1968, p. 18), within the behavior setting and analyzing these for lack of behavioral fit or conflict with other *synomorphs*. An example of such a link can be seen between stairs and persons climbing them. The behavior does not fit if people have difficulty climbing the stairs. The behavior is in conflict if the climbers are distracted by other behavior.

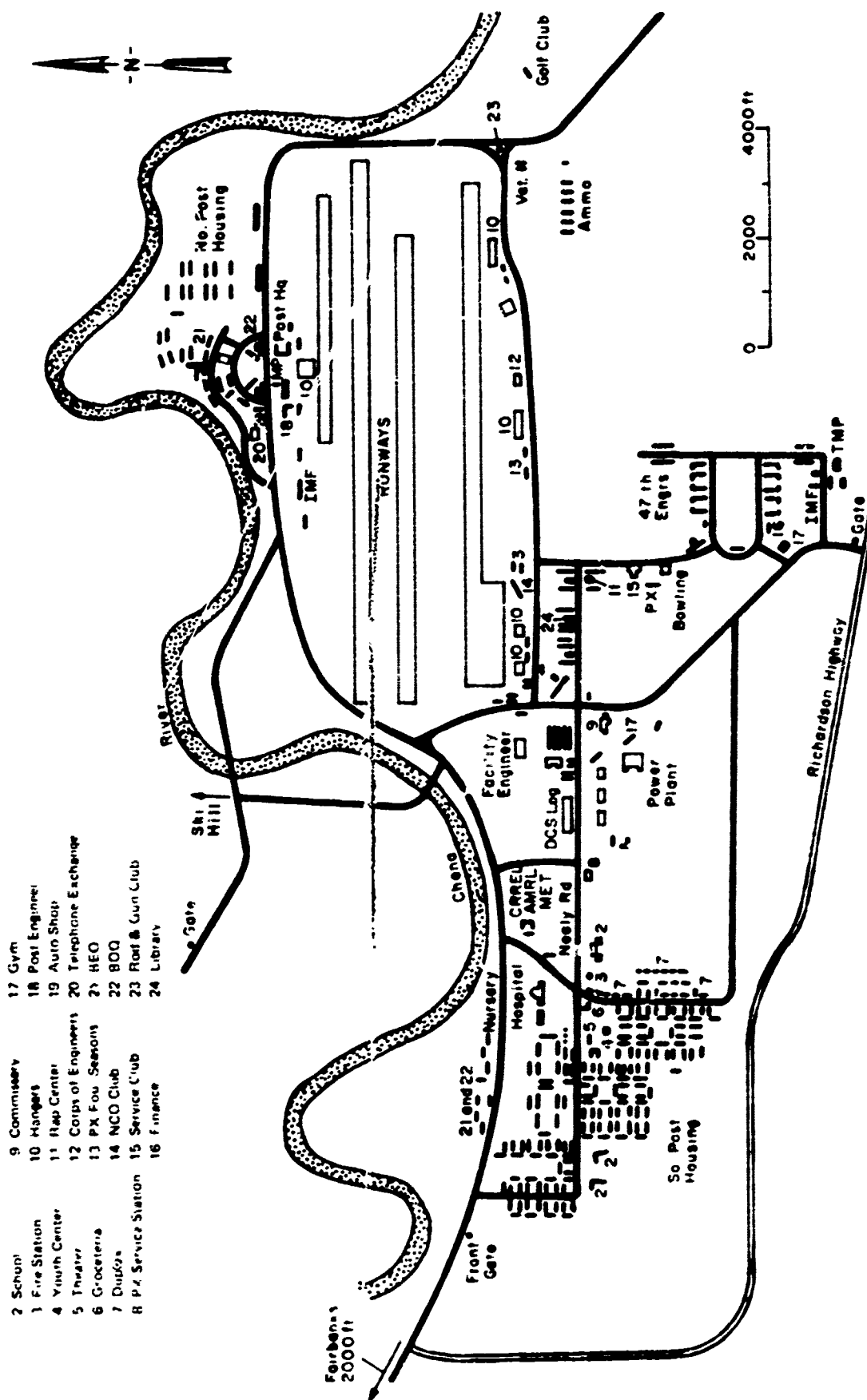


Figure 51 Fort Warr Wright site plan

Global problems. What are the principal differences in cold regions between military housing at a larger installation and civilian housing at similar mission-oriented institutions? The answer to this question would characterize the peculiarly military needs of housing at Fort Wainwright and highlight these needs as contrasted to those of civilian housing. Furthermore, since military installations are the only large institutions in Alaska, such a contrast would reveal differences between large and small military posts, information that is critical to Barker's undermanning theory (Barker 1960, 1968).

Fifty-one families were selected randomly from the 1145 families on base who were not in transient housing or out-processing. Forty families completed the questionnaire during interviews with the principal researcher Robert B. Bechtel.

Data from the questionnaire were then tabulated separately (see App. B) and also tabulated in the form of behavior settings. The behavior setting scales will be reported throughout this section.

Results

Site plan. Family housing at Fort Wainwright is arranged in two major clusters, north post and south post (see Fig. 31). The two areas are 2.65 miles apart. While most respondents preferred their own locations, there were noticeably fewer preferences for north post than for the older, but more spacious and better equipped, housing on south post.

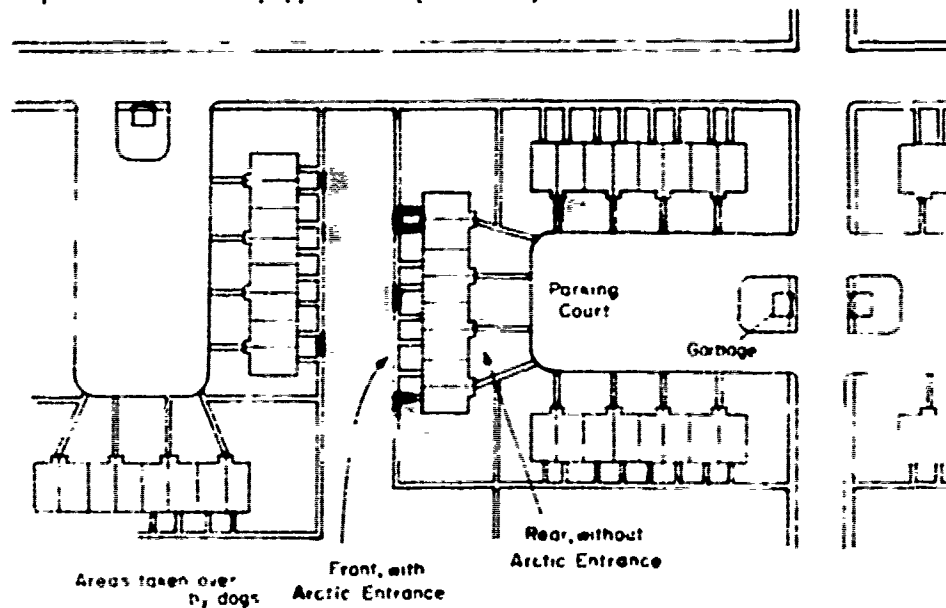


Figure 32. Fort Wainwright family housing courts

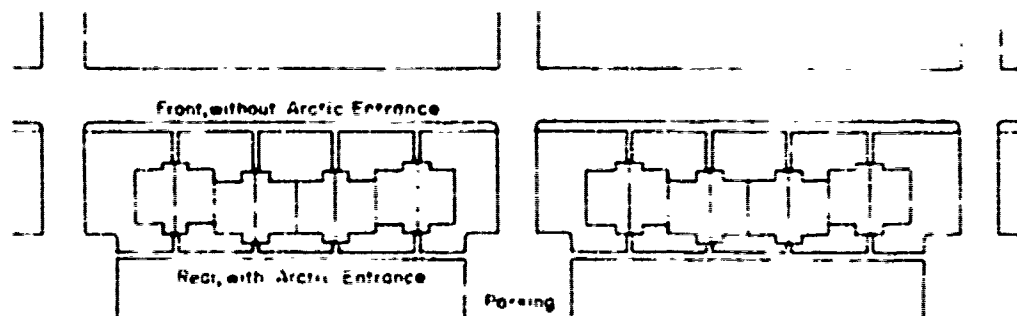


Figure 33. Fort Wainwright row housing

The western parts of south post complained about being far from services such as commissary. This, however, was much more of a problem for north post. The offsetting factor for being located at north post was a less crowded surrounding area, and most respondents on north post who had also lived on south post mentioned this as more than compensating for the distance.

Some barracks troops (but not a majority) also complained of being far from services.

The respondents living in courts (Fig. 32) were more dissatisfied with their conditions than respondents living in row houses (Fig. 33). Previous studies, however (e.g. Knight et al. 1974) show the simple row house plan to be the *least* preferred of all kinds of plans compared. Respondents in the courts felt crowded indoors and out, complaining that the yards were inadequate. The exceptions to this were the respondents living in end apartments (1 and 8) since they had three yards instead of two (Fig. 34).

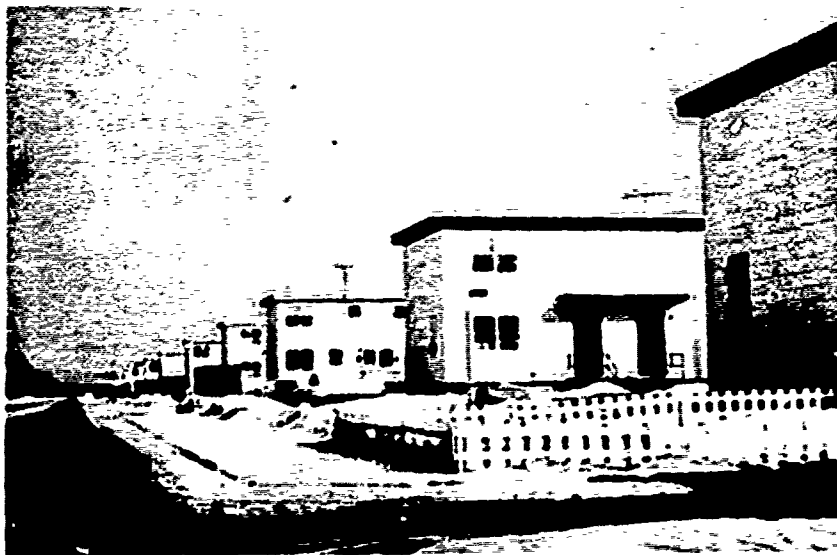


Figure 34. End house at Eielson AFB showing fenced-in yard.

A good comparison with military housing would be the Federal Aviation Administration family housing at the various FAA installations throughout Alaska. Four FAA installations were selected as typical for comparison purposes (see the classification of cold regions environments in 1974).

Figures 35 and 36 list the rating scales comparing FAA family housing with family housing at Fort Wainwright. Two sets of scales are compared, the action patterns and behavior mechanisms.

Action patterns. There are seven action patterns on which FAA sites show a lower percentage of total occupancy time than the family housing at Fort Wainwright. These include religion, education, business, government and professionalism as present percentages and recreational and social contact as prominent percentages.

The Army emphasizes religion a great deal more than the FAA, and therefore, the lesser percentage of the religion action pattern for FAA housing is in accord with observed behavior. Education is present in a greater percentage of occupancy time in family housing at Fort Wainwright because the soldiers tend to take correspondence courses in the home, while most of the educational upgrading in FAA takes place on the job. There is less business in the FAA settings because FAA personnel order less through mail catalogues and have their commercial parties, such as Tupperware parties, more in the recreation or utility buildings (Fig. 37 and 38) than in their housing.

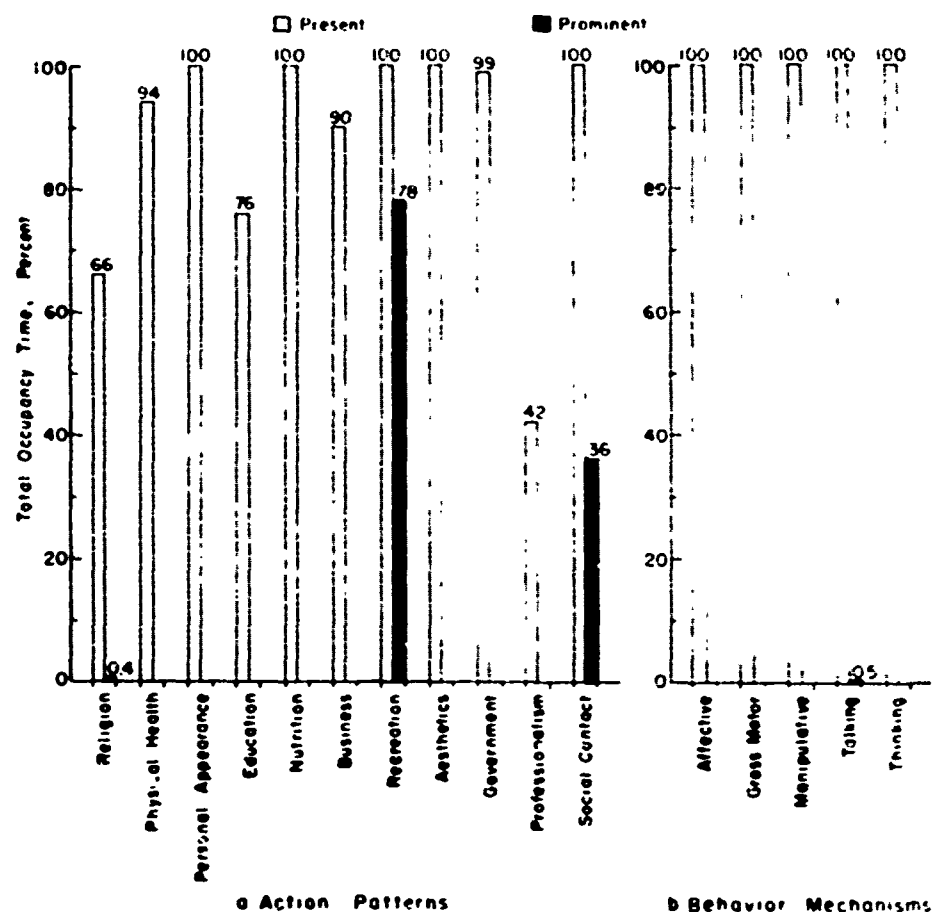


Figure 35. Action patterns and behavior mechanisms of Fort Wainwright family housing.

Recreation is an outstandingly prominent feature of the family houses of Fort Wainwright (78%) compared with recreation as a prominent feature in FAA homes (24%). There may be several reasons for this. One is that recreational spaces are provided outside the home by FAA very near the houses, and so parties, luncheons, and other activities high in recreation appear away from the housing (Fig. 39, 40, and 41). Therefore, the pursuit of recreational activities in Fort Wainwright takes place at greater distances from the houses than at FAA sites.

Government and professionalism occur more at Fort Wainwright than at FAA sites because military men generally spend time at home storing equipment and preparing for military assignments. The social contact differences are not large enough to be considered significant.

The conclusions from this comparison are that family housing at Fort Wainwright shows a higher level of recreational pursuits, and more educational and professional activities. These are the principal differences that seem to contrast the military housing at Fort Wainwright with the civilian housing at the FAA installations. The more basic action patterns such as nutritional, personal appearance and aesthetics appear to be similar.

Behavior mechanisms do not differ appreciably between the two types of housing, except that talking is a more prominent factor in the FAA housing. This difference is probably due to the presence of more children in the FAA units (111 children for 42 units in FAA, contrasted to 69 children for 40 units in the Fort Wainwright sample).

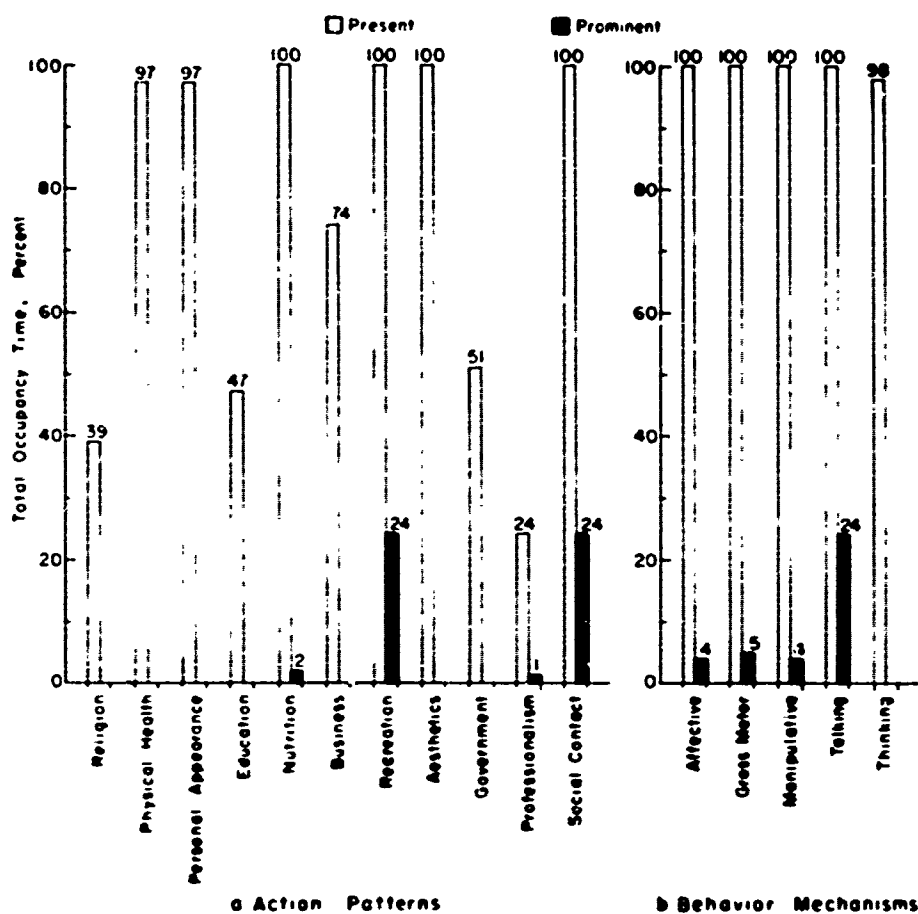


Figure 36. Action patterns and behavior mechanisms of FAA family housing.



Figure 37. Utility building at Cordova FAA location, used for library, food distribution, TV station, ceramics club, and various meetings.

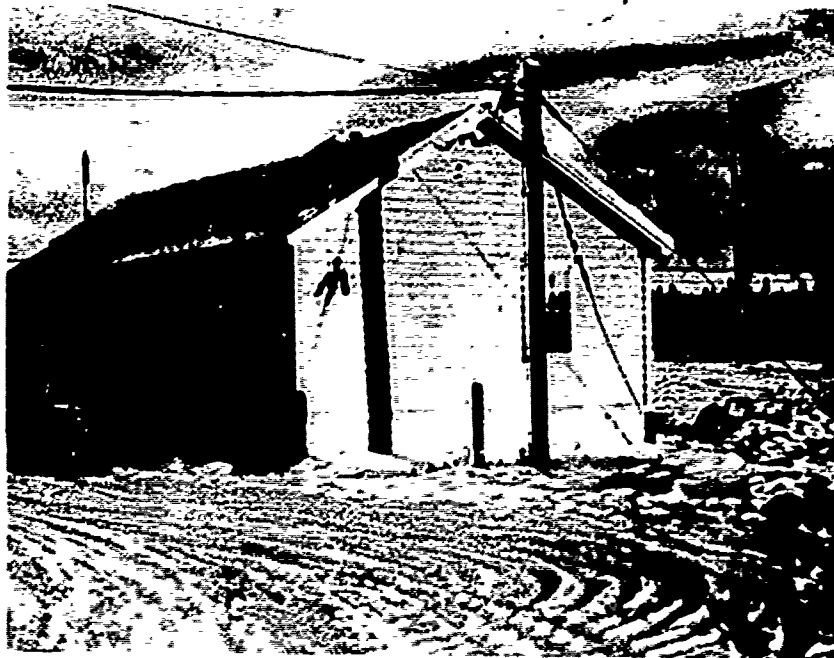


Figure 38. Recreation building at Gulkana FAA.

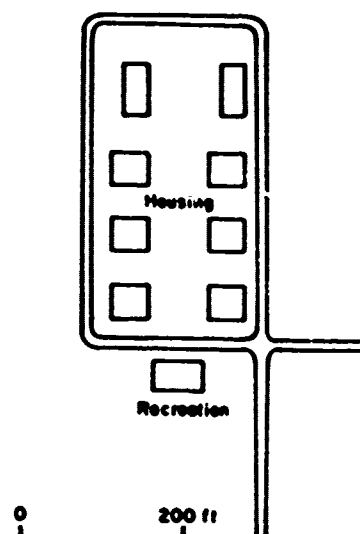


Figure 39. Location of recreation building at FAA compound.



Figure 40. Kitchen in recreation building at Gulkana FAA.

Comparisons of the Fort Wainwright housing data with those of Midwest (Barker 1968) would not be proper because those data reflect entire communities rather than just residential areas.

The general richness index shows that FAA family housing has a higher average index level (29.8) than Fort Wainwright family housing (25.9). Since the action patterns of the FAA were lower and the behavior mechanisms similar, the difference can be attributed to the greater numbers of children at the FAA (see the discussion on the talking behavior mechanism above).

Transient housing at Fort Wainwright has a GRI index of 13.3 and the barracks has an index of 12.3, indicating that the family housing environment is far richer and that differences between family housing and transient housing, at least, are not due to lack of children. Also, the general richness of the family housing behavior settings is more than twice the mean general richness index for all behavior settings at Fort Wainwright (12.06).

The conclusion from the general richness indices is that the family housing environment provides a richer environment than any other group of settings at Fort Wainwright. While much of this is due to the presence of children as additional age groups, it is also due to higher ratings on action patterns, particularly recreation.

Penetration levels were arbitrarily given as a level 6 if one person occupied a house or apartment, level 5 for a man and wife and level 3 for children in addition to parents. Adolescents and other adults (relatives) were given a level 4. This resulted in all family settings (of the 40) having a maximum penetration level of 5.

Autonomy levels for family housing settings were rated as follows:

Selecting Performers	9
Admitting Members	9
Determining Policy	2
Financial Arrangements	1
Average	5



Figure 41. Organ, stereo and couch in recreation hall at Gulkana FAA.

This contrasted to a level of 6 for FAA housing and 7 for Air Force billets at AC&W stations. FAA and Air Force have more local control over their housing policies.

There were three types of houses at Fort Wainwright (aside from officer duplexes, Figure 42). One type consisted of the larger, older units which contained an average of 1250 ft² (Fig. 43) built by the Air Force when Fort Wainwright was an air base. The second type (Fig. 44) built in the '50's was slightly smaller. The third type (Fig. 45) also built in the '50's had an average of 1080 ft² per unit. Actual square footage of each apartment varied due to the differences in number of bedrooms. Most had three bedrooms, but several had only one or two bedrooms. Naturally, the lower number of bedrooms was given to couples without children.



Figure 42. Officer duplex at Fort Wainwright.

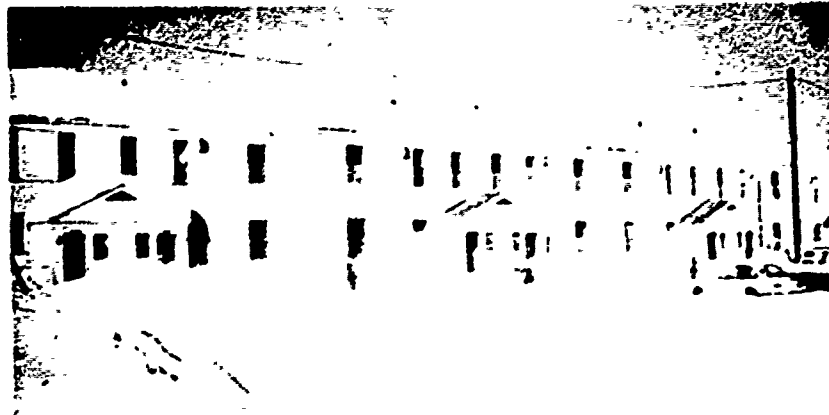


Figure 43. Type I older, larger housing units at Fort Wainwright (1250 ft²). (Photo courtesy of W. Tobiasson, CRREL).



Figure 44. Type II large units built in the 1950's (1250 ft²/units)

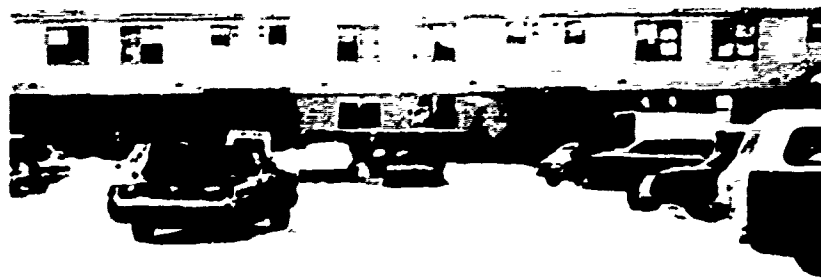


Figure 45. Type III smaller units (1080 ft²/unit). Note parking in court!

An interaction of design and planning factors operated to produce conflict between children's play and the parking areas (Fig. 46). The original design assumed that most traffic would go through the front door, and a cold weather (arctic) entrance was placed there. But when the parking spaces were provided in the rear, in the court area, then the most frequently used entrance became the kitchen (see Fig. 47) which did not have an arctic entrance.



Figure 46. Parking in the housing courts.



Figure 47. The kitchen became the most frequently used entrance because of the placement of parking areas in the rear.



Figure 49. Frequent use of the back door meant hanging coats where there was no room for them, and stumbling over garbage to get downstairs.



Figure 50. Galley-type kitchen at rear of ship forces all traffic through the work area.

Internal design problems in family housing (habitability requirements)

Sleeping group (second floor). A second bathroom was one of the most frequently mentioned desires in the family housing interview. This did not imply that one bathroom was inadequate in itself, but with large families it was a frequent source of complaint.

The fans in the present bathrooms are too large for cold regions and in winter they cool the house to the extent that many residents turn them off (Fig. 52).

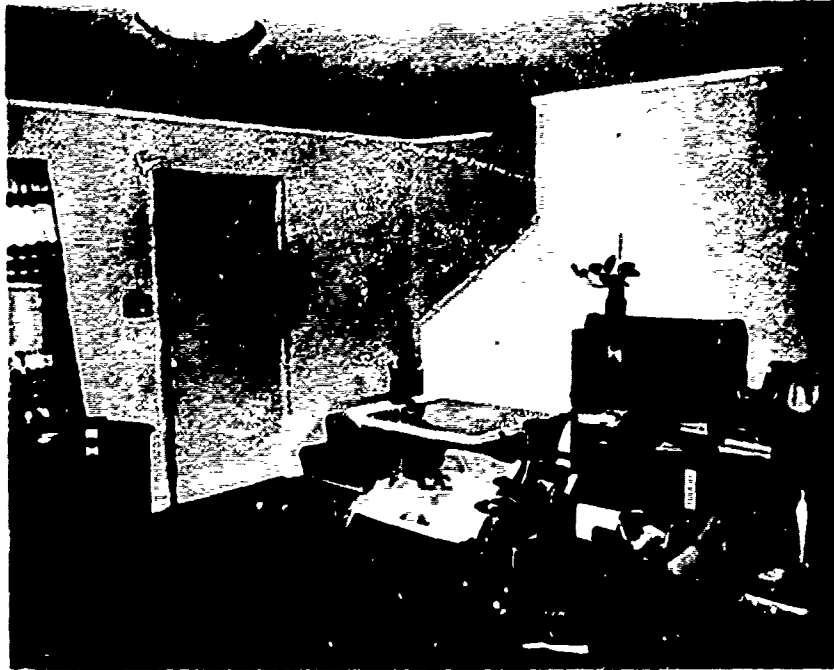


Figure 51. Typical living room in family housing that causes traffic across the center to get up stairs at back

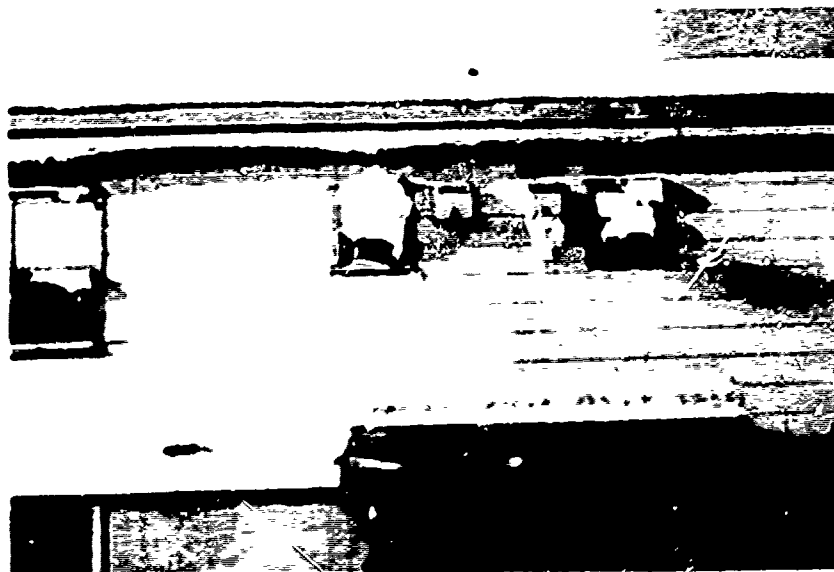


Figure 52. House on left turned off bathroom fan and thus did not accumulate moisture at fan vent as is noticeable next door. However, this meant more moisture collected at bathroom window on left

- Bedrooms were felt to be adequate by respondents but there was a tendency to use them only for sleeping and to crowd homework, play and other activities into the already overused first floor.

The acoustics of the bedroom wall facing the next apartment were such that residents tried to avoid placing the beds next to that wall. The poor sound insulation between apartments handicapped the residents in placing furniture in the bedroom.

Living area (first floor). Living room. Respondents generally indicated a high degree of satisfaction with the living rooms. It was difficult to arrange furniture, however. The desk and phone in the living room created problems, and some residents moved the desk into the basement. Most respondents were oblivious to the traffic route through the middle of the room (see Fig. 53).

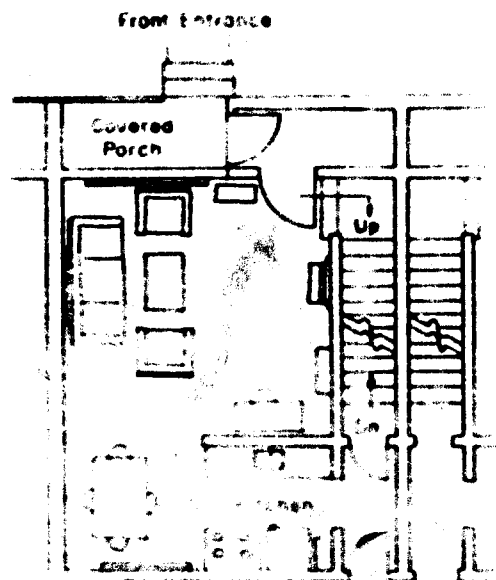


Figure 53 Fort Wainwright family housing traffic pattern through living room

The living room elicited no comment from respondents directly, but the Formica counter separating the dining room and kitchen drew high praise from residents (Fig. 54).

The kitchen (next to the basement) drew most comments from residents. Traffic through the kitchen by children was a common problem, as was the need for more electrical outlets and more shelf space.

Some residents, to satisfy the need for shelf space, had built shelves into the broom closet in the kitchen. This addition, however, contributed to a general need for more closet space.

The floor floor is covered with tile in several places. Better windows, better doors, a need to have more built-in cupboards and radiators, and a need for more ventilation in summer. There was no comment on the quality of the paint, but the lack of cupboards in the kitchen was noted.

The respondents wanted a better living room, a better kitchen, a better bathroom, a better bedroom, a better basement, a better porch, a better entrance, a better exit, a better view, a better sound, a better light, a better air, a better water, a better gas, a better electricity, a better telephone, a better mail, a better garbage, a better fire, a better security, a better health, a better education, a better recreation, a better culture, a better religion, a better politics, a better economy, a better environment, a better future.

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Figure 54. Formica countertop separating kitchen from dining area drew praise from residents.



Figure 55. Window with no storm windows. Notice two effects: 1) icicles forming under sill at left of window, freezing shut. Water forms inside and runs out, causing the icicles, and 2) moisture-laden air condenses at juncture of double hung windows and even under the roof eaves.

Having only one thermostat to control heat from the living room often meant basements and bedrooms would be cool.

The *basement* was the most frequently mentioned item in the housing questionnaire. Most residents wanted the basement "finished off" to add to their living space. Along with this was a need for more electrical outlets, and in some cases, a need for dry storage space since several basements leaked water through the foundation.

Outdoor storage was considered a problem by many because regulations did not permit storage of snowmobiles, motorcycles or other equipment indoors. Security of items left in the yards was poor. For example, C.B. Ledbetter had two baby strollers taken and destroyed by children, in addition to having his children's toys often disappear. His neighbors' experiences were similar.

The boiler in the middle apartment (no. 4) of each building creates a noticeably hotter apartment there, and at the same time cuts into basement space. Some of the no. 4 apartment dwellers complained that their apartments were too hot. Noise and vibration were noticeable in these apartments.

Conclusions and recommendations (habitability guidelines)

Three strategies were adopted to apply design conclusions to family housing. First was a minimal remodeling strategy. Assuming funds are scarce, this is a plan for a minimal cost improvement of the family housing environment to make it more suitable to human needs. The second strategy was one of maximum remodeling. Short of tearing the buildings down and building new, this strategy proposes how they can be rehabilitated for long-term future use. The third strategy dealt with design of new construction.

Minimal remodeling.

1. The first priority is finishing off the basement in family housing. This includes waterproofing some foundations from the inside, insulating the walls, putting up new surfaces, installing electrical outlets in the wall, and preferably installing an acoustical ceiling and a resilient floor surface (see App. B for justification).

Finishing off the basement will increase the living space for families and permit play space for children kept indoors during the long winters. This basement space could also be used for a fourth bedroom, or a study area.

2. The second priority is to provide paint for the wall surfaces of the apartment. Many residents complained of the colors or the condition of the wall surfaces, and 32.5% expressed a desire to have them painted. The residents should be able to choose the paint and do the work themselves.

3. The third priority is increasing the number of electrical outlets in the kitchen.

4. The next priority is the installing of fences in the yards. A majority of residents supported this, several with near violence.

5. An outside storage shed for various kinds of equipment should be built to alleviate much of the pressure on storage inside the house.

6. A paved or brick patio in either the front or back yard should be constructed. In single row houses, the patio would be used in the back yard while in the housing courts the patio would be used in the front yard.

Major remodeling (see Fig. 56)

1. Adding more space to the back of the house is of first priority. This would incorporate a second bathroom, storage closet and attic entrance/mud room.

2. The living room should be extended over the front porch, and the porch with overhead cover should extend into the yard.

3. The traffic pattern should be rearranged so that traffic goes through the new rear entrance to the side of the living room under the old stairs.

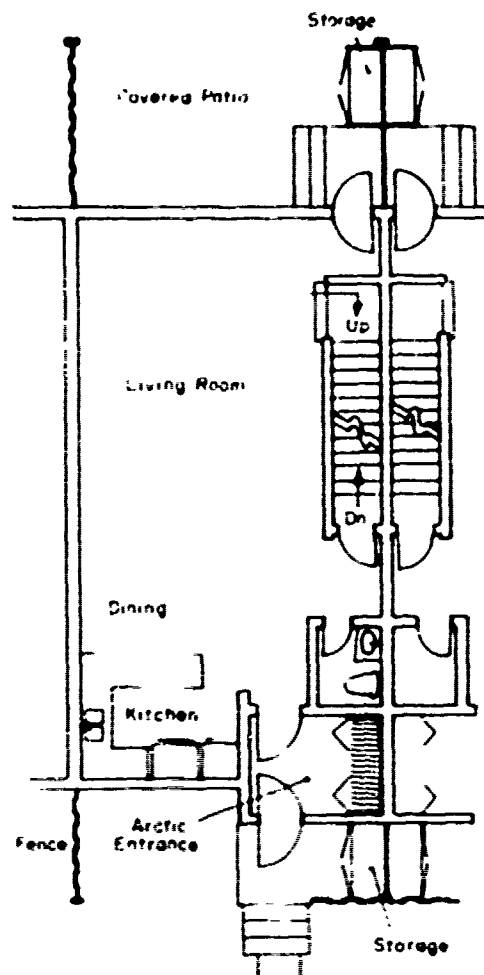


Figure 56 Suggested major remodeling of family housing.

The new wing in the back (1) and the new front extension (2), while reducing yard space, would increase the indoor living space considerably and add to privacy in the yards, both critical issues with residents.

4. The parking lot size should be increased by bringing curbs closer to the rear entrance.
5. A roof structure or carport should cover the cars since this would assist in keeping snow off them.
6. All new houses should include a finished basement with the same features as provided under minimal remodeling.
7. A second bathroom should be added, preferably in the new wing, but possibly in the basement. This could be a half, rather than a full, bathroom.
8. Children's furniture needs to be available for selection by residents. The current GSA furniture is only for adults and is inadequate. The furniture should include studio beds for children's rooms so that the bedroom space can also serve as a play room. Smaller dressers for children would satisfy storage requirements and increase space in bedrooms.

New construction (see Fig. 57 and 58)

1. New family houses should preferably be duplexes or triplexes on the cul-de-sac site plan (Appendix B, item 26).
2. Three-story, as opposed to ranch type houses, are more economical in cold regions because of the decreased amount of foundation and roof needed.

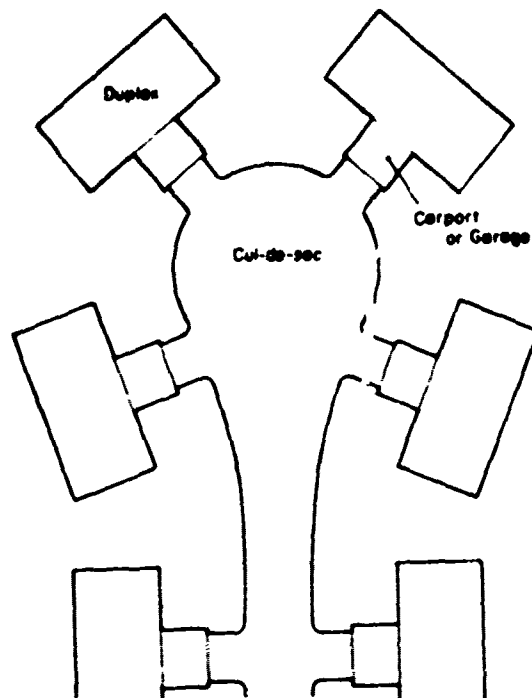


Figure 57. Duplex on cul-de-sac.

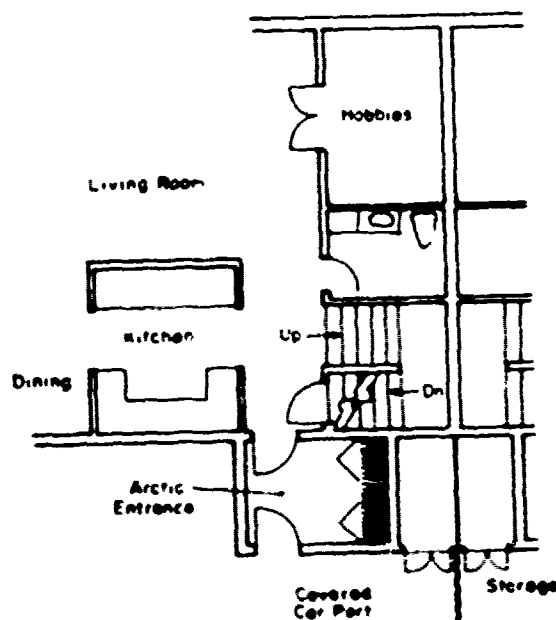


Figure 58 Family housing new construction.

3. New housing should provide a carport or garage because of the ravages of winter.
4. Fenced-in yards should be provided uniformly throughout the housing.
5. Outside patio would be used by nearly all residents instead of having to hold barbecues on the steps as is now done.
6. Previous problems would be eliminated by having 1½ bathrooms (and possibly one in the basement), a mud room, outside storage, a better-defined dining area, and a sewing or hobby space adjoining the rear living area.
7. A humidifier should be provided in the living room and bedrooms.

8. Floors in the living room and bedrooms should have wall-to-wall carpeting. This is largely for acoustical purposes.

9. Children's furniture and studio beds should be available.

TRANSIENT HOUSING

Transient housing, despite the short period of residence of permanent personnel, is the first encounter with the post for the permanent party and the only encounter for transients. It is often the source of reputation for a post and may be the only evidence a transient sees of how the post is managed.

Families move into transient housing when arriving on base and stay there until they move into family quarters. In the same fashion, a family will move into transient quarters until their house is cleared for the next family and until they can get transportation.

The population for transient housing is not inconsiderable. For Fort Wainwright's Murphy Hall alone in one year there were 1,004 adults with an occupancy time of 200,868 hours, 36 adolescents with an occupancy time of 13,408 hours, and 44 children with an occupancy time of 181,872 hours. These are just *on post* figures. Off post personnel, either temporary or just moving on post totaled 2,751 additional individuals with an occupancy time of 127,004 hours.

Including all other buildings (560 units), the total for all transient housing for one year at Fort Wainwright amounted to 6,552 individuals on post, 5,208 off post, with respective occupancy times of 1,387,431 hours and 317,896 hours.

Methods of study. The main building for transient housing at Fort Wainwright is Murphy Hall with 60 rooms using adjoining bath facilities. Families with children take two rooms, with the bath in between. Four additional buildings are used for transient housing as bachelor officer quarters (BOQ). Four buildings are used as bachelor enlisted quarters (BEQ) and five buildings were used as civilian bachelor quarters (CBQ). Whenever Murphy Hall was crowded, families would be moved into these other buildings. Families got preference at Murphy Hall so that, although it was ostensibly for officers, enlisted men's families would be sent there and officers sent to other BOQ quarters.

Both researchers spent some time living in transient housing. C.B. Ledbetter spent three weeks living in Murphy Hall with his family and pets. R. Bechtel spent 10 weeks living in Murphy Hall, BOQ, CBQ, and BEQ buildings.

Behavior setting surveys were conducted on all fourteen buildings used for transient housing during fiscal year 1974. Data were collected from records of occupancy in the housing office at Murphy Hall (Fig. 50).

(Global issues (habitability requirements))

Transient housing tends to be viewed much as if it were a hotel or motel environment where the emphasis is on sleeping quarters of short duration. But in fact, since transient housing is used by families for several weeks it becomes a poor substitute for family housing.

Site planning. Many people in transient housing in Alaska, because of the great distances in travel, are willing to buy automobiles or to receive them through shipment. Thus, it is necessary for transient housing to be located even nearer the amenities than family housing because a larger percentage of persons will need to be able to walk to these facilities. The only amenity within walking distance of Murphy Hall is the officers' club.

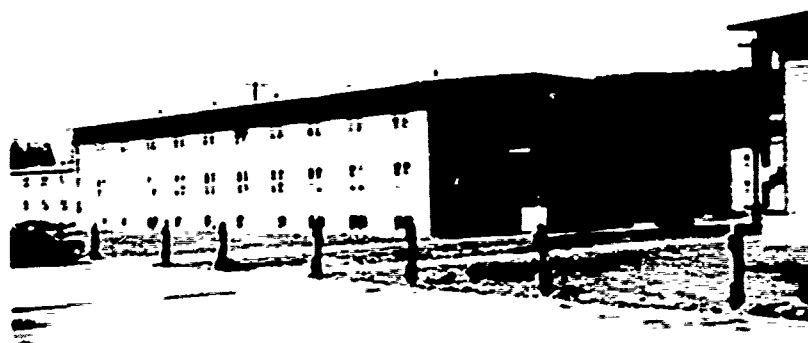


Figure 59. Transient housing buildings. (Photo courtesy of W. Tobiasson, CRREL).

It would also be a considerable advantage for outgoing personnel to be located as near as possible to the friends whom they are leaving in family housing. This advantage would be far more than social. Children would be on the same school route, and could still share the same play facilities and friends. Both adults and children could still visit their friends to gain some relief from the cramped quarters. A close location to friends would assist the transition period considerably.

Having children's playground areas that are visually accessible to the transient quarters is important if play areas for children are to be provided at all. These should be well-planned and based on the far greater likelihood of sub-teenage children in post families. (App. B documents this low number of teenagers.)

Tunnels. One of the advantages of Murphy Hall as quarters is that it is connected by underground tunnel to the officers' club. This proved to be an asset during the winter when the hall filled up with officers on field exercises. However, the use of the tunnel by dependents was fraught with some apprehension. The researchers missed by minutes an assault with a knife on a female employee of the officers' club, and were confronted with fresh blood on the tunnel floor. The psychological reaction to such an episode is similar to the reaction to parks elsewhere in the United States. Once such an event occurs, the area becomes stigmatized. Although the incident occurred in 1972 it was still being discussed in late 1974. The tunnel had a reputation as a fearful place for women. Despite this, it must be noted that children played freely in the tunnel with or without knowledge of their parents.

Heating. It was the universal experience of personnel in transient quarters that the buildings were overheated. This caused windows to be opened in -50°F weather. Individual radiators could be turned off only by maintenance men, so that individuals had no control over the temperature. While adults were able to cope with this problem to some extent, children had more trouble with it and had to be watched carefully so that they would dress properly before going outdoors.

For all concerned, the excessive heat often meant going to subzero (°F) cold with perspiration on the skin. The overheating of buildings seemed to be a universal experience in Alaska and was found at Elmendorf AFB (Fig. 60), Fort Richardson, Galena AFB, Murphy Dome AC&W Station, Kotzebue AC&W Station, and Carleton AC&W Station. The AC&W Stations did tend to overheat less because of greater access to maintenance personnel.

Behavioral environment

Figure 61 shows the action patterns and behavior mechanisms of transient housing. The profiles are somewhat flat, but not so flat as for the barracks (see App. B for barracks data). The *religion* action pattern rating in transient housing is noticeably lower than that of the barracks but so are *education* and *business*. There are small prominent measures (8% of occupancy time) of religion

Too Hot!!

SUBJECT: Office Memorandum 8-22 (PWS 8-2-0)

21 Nov 11:12

70- Sergeant, FBI Facilities
 Agent of FBI, alone

1. The following DC rules w. modifications:

6. It is requested that you please inform the FBI, if it is possible, of any information that you may have regarding the activities of the above named individuals. This is to be done in the form of a letter to the FBI, dated 10-10-60. All requests and other correspondence should be sent to the FBI, New York City, New York.

b. Change of policy treatment effective
to 7 days before

6. The effect of treatment effects on the results of the study.

6. Date of last physical contact with the subject (If none, leave blank).....

.. There is also a note on page 10 of the report that the
the following information was obtained from the source who provided it:
on page 10 of the report.

8. P20; 2nd ed. = 1st ed. as stated; 2d : 1973 ed., 1st : 1968

Re: C-83A 10 x 1 1/2 inch. 10 x 1 1/2 inch.

2. The first officer is advised by the P.O. that the
first officer is to be placed in the car.

1. 3-10-68

W. J. [Signature]
2. J. J. [Signature], 2. J. J.
[Signature] [Signature]

100 110

Figure 1: Total Occupancy Time, Percent

a Action Patterns

Action Pattern	Prominent (%)	Present (%)
Religion	8	99
Physical Health	0	91
Personal Appearance	0	100
Education	0	100
Nutrition	0	99
Business	0	99
Recreation	8	100
Aesthetics	0	100
Government	0	100
Professionalism	0	100
Social Contact	0	100

b Behavior Mechanisms

Behavior Mechanism	Prominent (%)	Present (%)
Affective	0	100
Gross Motor	5	100
Manipulative	7	100
Talking	3	100
Thinking	0	82

7.

and recreation. Since *recreation* is noticeably lower than in family housing (only a few of the transient housing rooms have TV sets), this is an indication that families have to leave transient quarters to find recreation, and they were frequently observed doing so. This made the recreational pattern much lower in transient housing. Since there is even more spare time on the part of transient housing residents, the need for recreation is probably greater; however, the facilities do not permit as much of this outlet. At Murphy Hall only three behavior settings among 60 rooms provide prominent recreational behavior: the TV room, the lobby and the basement lounge. They account for only 31% of the occupancy time in the building. This contrasts to 78% of occupancy time in family housing — a deficit of 47%. However, the picture for transient housing is actually far worse, since 71% of the occupants of Murphy Hall's three recreational settings are people not staying at this hall.

The low educational profile, contrasted to family housing is probably due to the temporary status of the personnel during which correspondence courses are suspended. Thus, there is less need for a larger study area.

Nutrition is as highly present in the transient housing as in the family housing. This is due to several factors. Although there are no kitchens in the transient housing rooms, some buildings have them located in basements or other areas and food can be cooked there. Also, there is wholesale disregard for the rule that forbids cooking in rooms. Residents bring in hot plates, electric fry pans and other appliances. Refrigerators are in all of the rooms of Murphy Hall but only in some of the rooms in other buildings.

Business is noticeably low because residents of transient housing must go outside the rooms to make any purchases. Few mail order sales are made in transient housing because of the lack of permanent addresses.

There is a high *professionalism* rating in transient housing due to the paid services of maids being added to whatever professional activities there are of residents.

Social contact is lower for transient housing because of the reduced facilities. The families, when in the hallways, hush their children to silence (not always successfully) because the poor acoustical insulation between the rooms makes everyone conscious of being overheard.

Behavior mechanisms are not appreciably different in transient housing from family housing except that gross motor behavior, manipulation, and talking seem to be slightly more prominent. These differences are attributed to the greater movement of the families in transient housing, creating the need to go out of the rooms for recreation.

Transient housing at Fort Wainwright has a GRI of only 13.28 compared to Fort Wainwright family housing's 25.88 or FAA family housing's 29.77. Transient housing is almost as low in its GRI as the barracks with 12.99. The reasons for this are the confining aspects of transient housing.

Security. Security for families and individuals in transient housing is a more serious problem than in family housing or barracks. There are two reasons for this. One is that people traveling will tend to carry valuables and money with them that they would ordinarily store in safety deposit boxes or other secure places. Although a safe is provided for valuables in Murphy Hall, it is small, and many residents, as in hotels everywhere, tend not to use it. Travelers, despite ads for travelers checks, will carry a great deal of cash. Secondly, in the transient buildings both the space and people are anonymous. Thus, no one knows if a stranger is entering the room next door or whether he is the resident. Other studies have shown (Newman 1972) that anonymous space is more likely to breed crime.

Pets. The majority of families at Fort Wainwright have pets. Yet no provisions are made for pets in transient housing. Not only are there no provisions, it is not legally possible to have a pet in

transient housing. This rule is probably violated more than any other in the housing environment. Some transient housing residents keep pets in the rooms, while a very few others pay exorbitant prices to board pets in town.

Most civilian motels and hotels will make some provisions for pets and even advertise their pet facilities. Needless to say, the strain of having to keep pets under the adverse conditions at Fort Wainwright does not make the stay in transient housing easier.

Laundry. Laundry facilities were so often overused in transient housing that residents had to spend an entire day waiting for a chance to use the washers and dryers. This often involved either leaving children unattended or taking them along.

Accessibility to cars. Although some transient families do not have cars, others have their automobiles, campers, or trailers packed with gear. Residents are often concerned about parking these vehicles where they can't be seen. At the same time, traffic to and from the vehicle is heavy because of the need to get things packed or unpacked. The closest possible access to vehicles therefore is necessary, and if possible, a view of vehicles from the rooms would also be desirable.

Internal design problems (habitability requirements)

Rooms. The average family when leaving the base is placed in a room or pair of rooms with less than one-third the living space they had in family housing. Although children comprise one-third of the population at Fort Wainwright, there is little provision for them. Two cribs per floor (four in all) are available at Murphy Hall and these are in poor condition. Children go unattended to the TV lounge but this is the only recreation facility for them. Outside of this, there are no provisions of any kind. Children in a large family will have to double up on the narrow single beds, and have to cope with an environment designed for adults. There are no swings in transient housing and those nearby are jealously guarded by residents.

The frequent violation of the cooking prohibition would seem to indicate a need for cooking facilities. Yet, the lack of space does not permit the addition of another function. In some CBQ's, kitchens are available but this means carrying food to be eaten there and often waiting in line. Most families don't bother to do this.

One BOQ building and CBQ building had dining rooms. One was frequently used although it meant that residents had to do their own cooking and cleaning. In the other, the dining room was never used because residents moved a table and chairs into the kitchen and used it as a dining room.

The large desk is unnecessary in each room, and a smaller desk would add more usable space. Despite the transient nature of the quarters, there is no space for suitcases and baggage, which the residents have to store as best they can either in locked basement storage rooms or in their vehicles.

Many of the refrigerators provided in transient quarters are larger than those provided in family housing. Smaller and more strategically placed refrigerators would be more practical and space saving.

Rooms generally contain two electrical outlets and these are taken up by the refrigerator and lights, leaving only one available plug.

The types of beds in transient housing are exactly the same as those used in family housing. But the transient quarters are so crowded for families that it is imperative to provide studio (convertible) beds to permit multiple use of the room.

Lighting for the rooms is inadequate, especially for family use. One ceiling light fixture and one desk or night stand light are provided for each room. Residents are constantly moving the desk lamp around.

Bathrooms. The shared bathroom concept has its disadvantages in the transient housing environment. In many buildings the door to the hallway cannot be locked by the resident. Therefore, the bathroom becomes part of the hallway as a behavior setting and, for security reasons, residents must lock their rooms while in the bathroom if they are alone. This poses a special problem for families occupying both rooms, because if they want to leave the two inner doors open to hear their children, the entire living unit is insecure. Also, the hallway door has an open panel for ventilation which allows an exchange of noise levels from hall to living quarters, creating a severe lack of privacy. Parents are motivated by these conditions to keep children quieter than usual.

Bathroom conditions have deteriorated in most transient housing. Sinks lack drain guards, ventilation is poor, and insect control is lacking. One of the researchers had a daily fight with silverfish in the bathroom which would crawl into shoes or slippers left behind while he was taking a shower (in a stall which did not drain properly and filled with water at each use).

Since acoustics in the transient quarters were much worse than in family housing, bathroom noises were more of a problem. Better bathroom fixtures could alleviate the noise to some degree.

Conclusions and recommendations (habitability guidelines)

Minimal remodeling. (Minimal remodeling will be considered as modification that can be made without changing room space through construction.)

1. Studio beds are of the highest priority because they permit the sleeping area to be converted into living space during the day. Two studio beds would actually sleep four persons comfortably in a space that now is occupied by only two.

2. A small refrigerator incorporated with a hot plate shelf that would accommodate coffee making and pastry heating should be installed. These appliances would be similar to those in modern hotels and motels.

3. A similar desk that could double as a dresser should be supplied to the rooms. This would provide a writing surface and not take up the space that the standard desk does.

4. Lockable, secure storage lockers should be provided in the basement. This is necessary for storage of suitcases and other items carried in travel. The space in the basements of transient buildings is available and unused.

5. For improving acoustics, wall-to-wall carpeting and an acoustical tile ceiling should be provided throughout the entire area (except the bathroom).

6. Bathroom doors, room doors, and doors into the hallway should be soundproof.

7. Doorways into the hall should be capable of being locked by keys that open either of the two rooms. These are already available in some quarters.

8. A variety of floor and desk lamps should be provided. These should be installed with additional electrical outlets so that each room has a minimum of one available outlet for each wall.

9. More dressers or bureaus, vanities and shelving than presently in the rooms should be provided.

10. Sun blackout shades should be available for summer use.

11. Phones should be provided for each room as they once were in Murphy Hall. The system of one phone to a floor does not work well as a communication system. It imposes a burden on the rooms next to the phone, and messages are often not delivered. The phone in the hallway becomes anonymous property.

Maximum remodeling and new construction.

1. For transient housing, one story construction with outside access to each apartment and to automobiles is the most preferred circumstance. However, two story construction may provide adequate visual access to the outside and the automobile.
2. A day-care center should be provided for children in each building or on each building floor. These could be staffed on a volunteer rotating basis by residents and would permit time for wives and husbands to perform necessary errands. A secondary benefit would be that the day care center would bring more families into contact and reduce the anonymity of the transient housing.
3. Laundry facilities should be provided in small areas with ironing facilities on at least every floor and also near the day-care center area, rather than in one large group in the basement. This would help reduce the anonymity of the laundry space.
4. Play areas should be constructed next to each transient housing unit, fenced-in for either pets or children, and placed to provide a view from the adjacent quarters.
5. Parking space should be provided for oversized trailers and motor homes since these are extremely popular in Alaska. These parking spaces should permit close access to the rooms. Perhaps every parking space next to the transient housing should be built to accommodate such vehicles.
6. Transient quarters should have the most convenient access, within walking distance to the necessary amenities. Perhaps covered walkways or tunnels should be provided. Close eating facilities are especially critical for families with small children.
7. Bathrooms should have extra storage space for cosmetic items; perhaps small linen closets in the hall would do.
8. A television set should be available for every unit.
9. The day-care center should be arranged as the central focus of a lounge-food area and the laundry facility. The lounge area should have vending machines and a snack table arranged in view of the day care center (see Fig. 62).

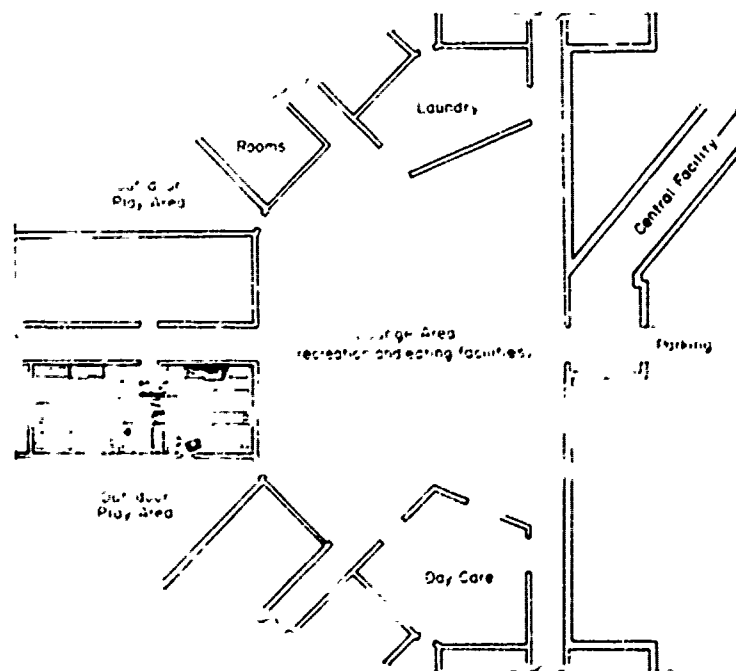


Figure 62. Transient housing for families.

10. Thermostatically controlled heat with humidity control should be provided for each unit.
11. Special attention must be given to providing acoustical insulation in walls, floors and ceilings. Doors need to be sound-tight.
12. Blackout shades should be standard for all windows to control sunlight in summer.

BARRACKS

For the same reasons that family housing was studied, the barracks are also important. They represent the one place where the single enlisted man spends most of his time. The barracks reflect the Army's view of the soldier to a greater degree than does family housing. Soldiers in barracks are more prone to interpret their physical surroundings as directly expressing Army policy than are men in family housing (Fig. 63).

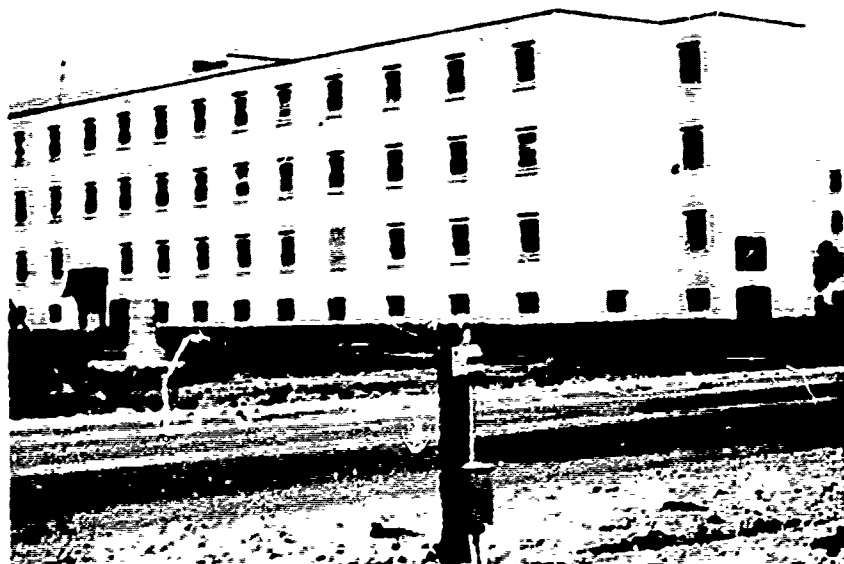


Figure 63. Typical barracks building, Fort Wainwright.

Methods

Most of the barracks data came from the questionnaire given to each respondent by his sergeant. A random sample of the 625 men in barracks units was taken and 65 men were selected to complete the questionnaires. Response completions ranged widely from 55% to 95% (of 65), depending upon the question.

The researchers also visited the barracks and talked informally with several occupants and catalogued synomorphs of the environment.

Results (habitability requirements)

Site planning (Fig. 64). Although many men in the barracks were located as far as two miles from some central facilities of the base, most felt that their location was satisfactory (App. C, item 24). This was because they were placed near to essential services, which are more critical for single men who are not as likely to have automobiles as family men.

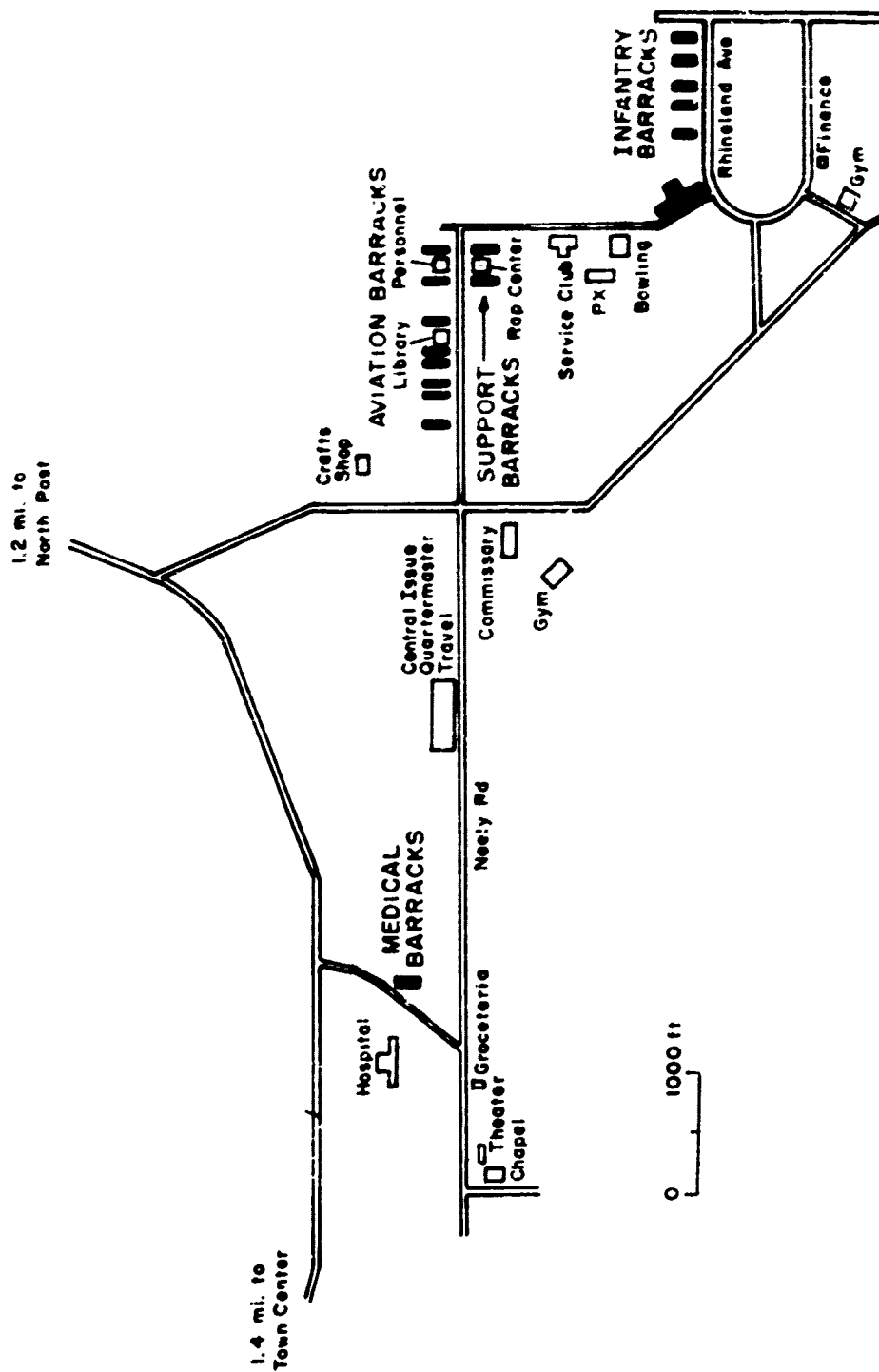


Figure 6-4. Location of barracks at Fort Wainwright

Life styles. Barracks and family men live distinctively different life styles. The family men are more schedule and home oriented while the barracks men are more willing to go along with the climate and have more flexibility (see App. C, items 8, 9, 10, and 11). The two groups, commanders told researchers, do not mix together as well in the field as should be expected.

Men in the barracks read and study a great deal more than the married men (App. C, item 16). Consequently, acoustical conditions are more of a problem in barracks, yet the conditions in barracks are less tolerable for sound than in family housing in the present state. The majority of men living in the barracks have a negative attitude toward the barracks as a living space. Twenty-nine percent could not find a single good thing to say about the barracks.

In general, the men seemed to prefer quarters that would approximate a civilian apartment.

The behavioral profile of the barracks is one of the flattest and least individualistic of any seen in the history of ecological psychology (see Fig. 65).

Action patterns are uniformly present for 100% of the time with only one exception, religion (which accounts for only 2% of occupancy time). In a similar fashion the behavior mechanisms are 100% present but not a single one prominent. To the researchers, this profile conveys much of the lackluster and utterly uniform quality of life in the barracks. Some men complained that they were not treated as adults by the Army and resented being told how to live their personal lives.

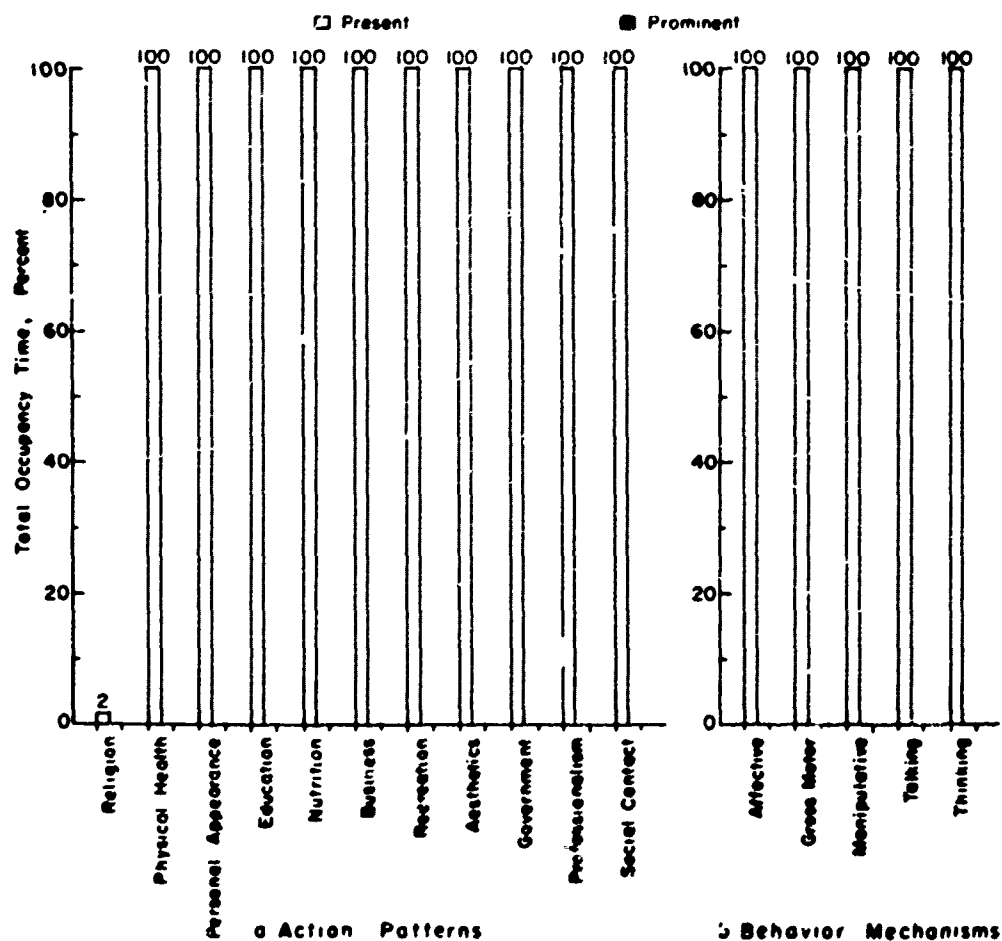


Figure 65. Fort Wainwright barracks action patterns and behavior mechanisms.

The general well-being index for barracks was the lowest for all three types of living quarters (12.3), more than twice as low as family housing. While some of this was due to lack of children, the major reason for the low index resulted from the flat characterless flow of life that goes on in the barracks.

Despite the poor facilities in the barracks, the researchers can only conclude from the nature of the data that the quality of life is not related only to physical environment but also to the management of the behavior.

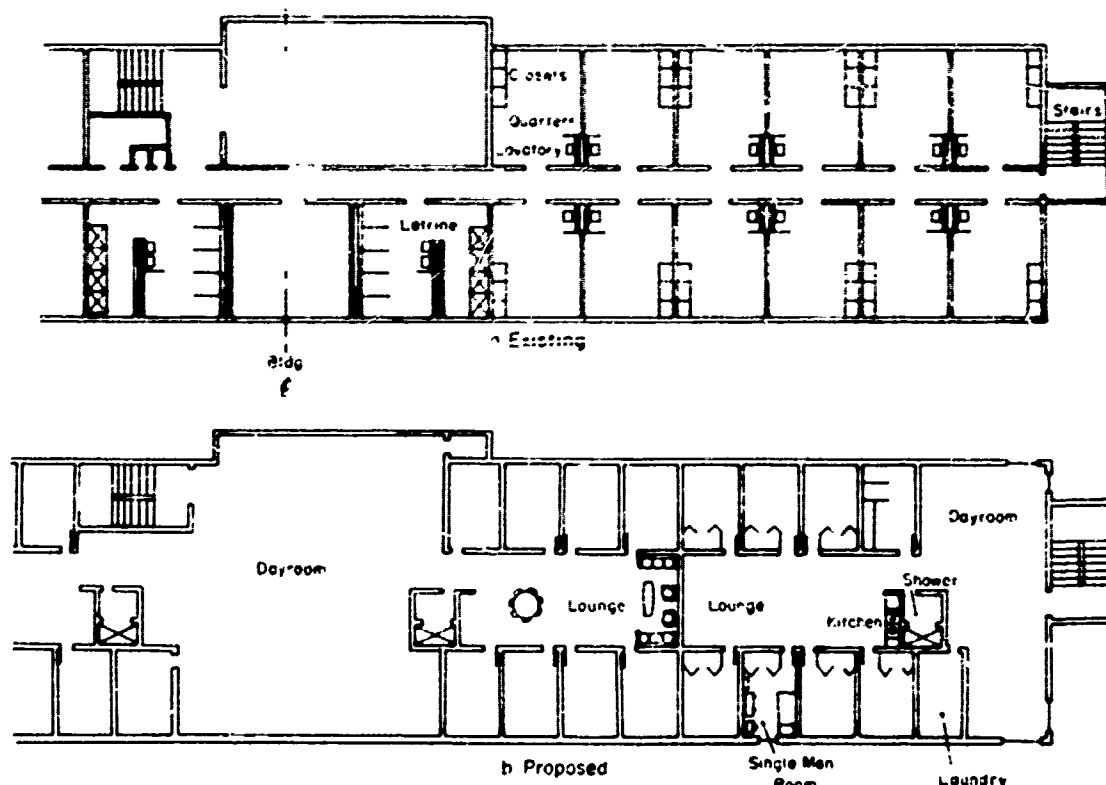


Figure 66. Floor plan, existing and remodeled, of Neely Road barracks.

Internal design (see Fig. 66, floor plans of existing buildings).

1. The rooms. There was decided preference for single rooms (Fig. 67) with a private bath (see App. C, items 20 and 24). This is consistent with findings by other researchers (Sellars 1968) and was also confirmed by data from the AC&W stations. The latrine (Fig. 68 and 69) was disliked because of the inconvenience of having to walk to it, the lack of privacy, and the smell (see App. C, item 22). Respondents much preferred a bathroom of their own, if only a half bath. Lockers were a disliked item and many preferred that they be replaced by bureaus and dressers (Fig. 70).

Posters were the most popular item of decoration (Fig. 71), but many expressed a desire to paint the room, and the majority of the men were unaware of the self-help program that would provide them with the paint to do so (see App. C, item 17). More men reported reading as an activity than TV watching. More men in the barracks studied (see App. C, item 16) than in family housing, making the barracks room a place for reading much more than the family house. Letter writing was also mentioned as a significant activity (see App. C, item 17).

Rugs would be the first item most men would put in their rooms if available.

Security of the rooms was a critical concern. There were complaints of theft, suspicions of neighbors, and other disturbing feelings expressed about not being able to lock the doors. These feelings were expressed in interviews and did not appear on the questionnaire.



Figure 67. Rooms improvised by use of locker arrangements and drapes.

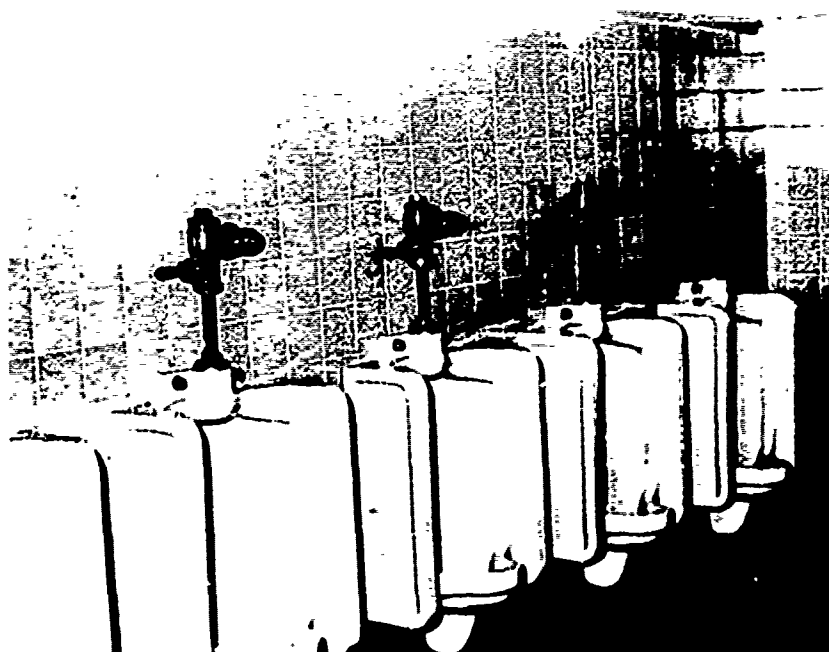


Figure 68. Typical latrine facilities pre-empting any possibility of privacy.

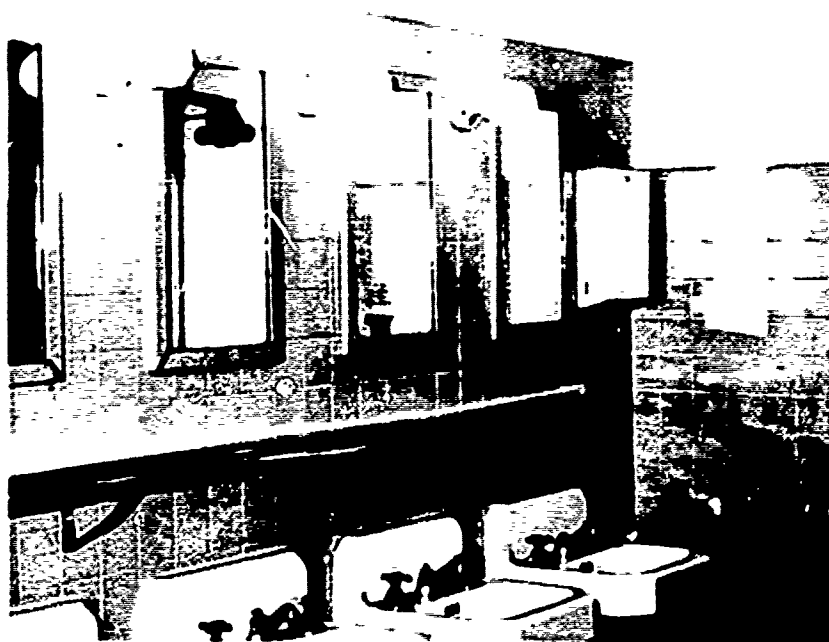


Figure 69. Typical washing facilities in latrines.



Figure 70. Typical locker and its contents in a barracks room.



Figure 71. Typical posters used to decorate barracks rooms.

Windows were found to be too high for soldiers to see out while sitting in a chair (Fig. 72). In several rooms on each floor the overhead ventilation system protruded into the living space (Fig. 73).

Some of the barracks at Fort Wainwright have a wash stand in each room. To determine whether this one feature had any influence on how the men viewed the barracks, the barracks questionnaires were divided into those for individuals with wash stands (N=24) and those for individuals without them (N=16). Of the 16 persons without wash stands, seven mentioned the washrooms or latrines as an undesirable feature of the barracks. Of the 24 persons with wash stands not a single one mentioned the washrooms or latrines as an undesirable feature of the barracks. The possibility of this difference occurring by chance alone is less than one in a hundred ($\chi^2=7.51$, $P<.01$).

2. The public spaces. Public spaces in the barracks are the dayroom, the laundry, and the latrines. Dayrooms drew mixed responses because some units had made a strong effort to decorate the room and make recreational activities available while other units had merely a bare space with two pool tables (Fig. 74).

The laundry room was frequently criticized because the equipment would not work and was not repaired (App. C, item 24). It was even ahead of the latrine in being cited as a place that needed improvement.

Generally, the more that anonymous public spaces can be incorporated within private room space, the more the men will care for and take care of these areas.



Figure 72. Windows in barracks. Windows were found to be too high for someone to see out while sitting in a chair. Note chair next to window on a built-up platform to enable the occupant to see out from his chair.



Figure 73. Ventilation equipment protruding into the room.



Figure 74. Barracks "rec room" with no facilities except two pool tables.

Conclusions and recommendations (habitability guidelines)

A three strategy plan will also be followed in the barracks recommendations.

Minor modifications to barracks.

1. Wall-to-wall carpeting
2. Acoustical ceiling
3. Soundproofing and lockable doors
4. Dressers and bureaus, instead of lockers
5. Paint supplied through a well-publicized self-help program.

Major remodeling for Neely Road buildings (see Fig. 66).

1. Building must be gutted, leaving only the basic structure
2. New windows, heating, ventilation, plumbing and electrical fixtures should be installed
3. New partitions (as shown) should be installed
4. Interior finish should be the same as in new construction.

Major remodeling for Rhineland Avenue buildings (see Fig. 75).

This should be the same as for Neely buildings except for the addition of an exterior stairway.

New construction (see Fig. 76)

The habitability guidelines provide for small single rooms, studio couches, closets, dressers, shelving and writing desks or tables. The window sill level should be such that one can sit in a chair and gain maximum view. There should be several desk and floor lamps to provide zone lighting. Wall surfaces should tolerate constant perforation and should be easily repainted. There should be sun black-out shades on the windows and the walls. Doors should be soundproofed, and each room thermostatically controlled.

Windows should be operable with screens.

Rooms should be clustered around a central lounge, containing a kitchenette, refrigerator with lockable sections, TV, lounge chairs, sofas and a dining table.

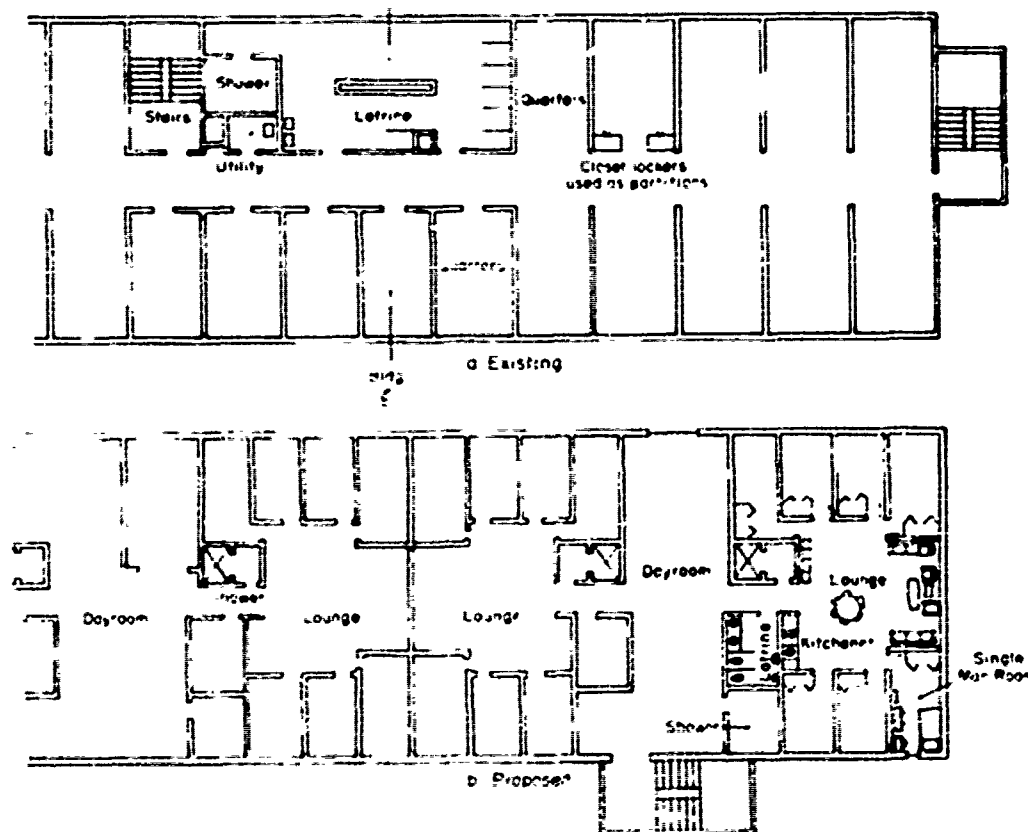


Figure 75. Floor plan of Rhineland Avenue barracks, existing and remodeled.

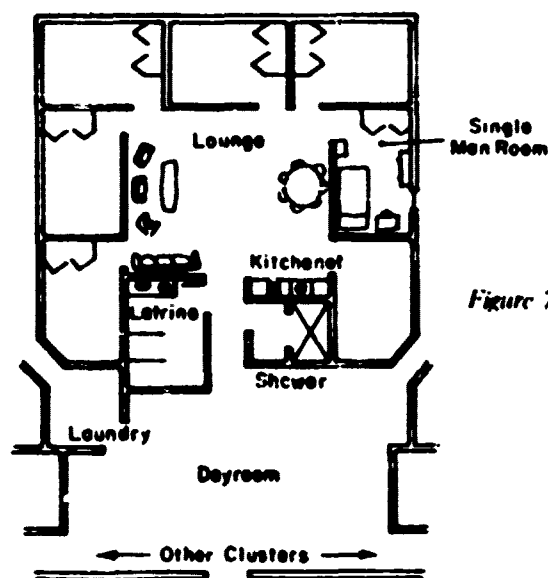


Figure 76. Barracks floor plan - new construction.

The latrine and shower should be located just off the central space. These clustered areas intersect in a day room for each floor. Off the day room is the laundry. Pool tables, game and other recreational areas are located in the day room.

Barracks dimensions (see Fig. 64, Neely Barracks is located on Neely Road and Rhineland Barracks on Rhineland Road) The barracks on Neely Road contains 8,316 ft² per floor for the

housing of an average of 48.3 men, or 172 ft² per man. 1100 ft² is taken up with the hallway, amounting to 23 ft² per man, or 13% of the indoor space.

The Rhineland Barracks has 7875 ft² of space and 44 men per floor for an average of 179 ft² per man. 1505 ft² is taken up by the hallway, accounting for 34 ft² per man or 19% of the floor space.

Including a day room in the basement would add about 2,200 ft² making a total of 196 ft² per man. This includes a proportional amount of stairway space.

The suggested Habitability Guideline would allow 4176 ft² of floor space for 21 men, or 199 ft² per man. Only 96 ft² would be allowed for hallways, amounting to only 5 ft² per man or only 2% of space in the form of hallways.

THE WORK ENVIRONMENT

The indoor environment that accounts for the second largest block of time for military and civilian residents in Alaska is the place of work. Typically these are office or office-like settings, but many can involve work such as vehicle repair, over-the-counter sales, or construction. It was not possible to sample all of the work environments at Fort Wainwright, so efforts were made to cover the largest work environments in terms of the number of people employed. The study of work environments was divided into global and specific units. The global study looked at the general work environment for an entire post or administrative unit, while the more specific studies looked at administrative units at the bottom of the chain of command. To consider the more global aspects of the work environment, all the work settings for FAA stations were combined, and the several aspects of the largest work unit of Fort Wainwright, Deputy Chief of Staff, Logistics (DCS Log) were combined.

For the more specific studies smaller units were used within Fort Wainwright, such as the Installation Maintenance Facility (IMF), Finance, 47th Engineers, USA CRREL Alaskan Projects Office, Bassett Army Hospital and Arctic Medical Research Laboratories (AMRL) (Fig. 77-81).

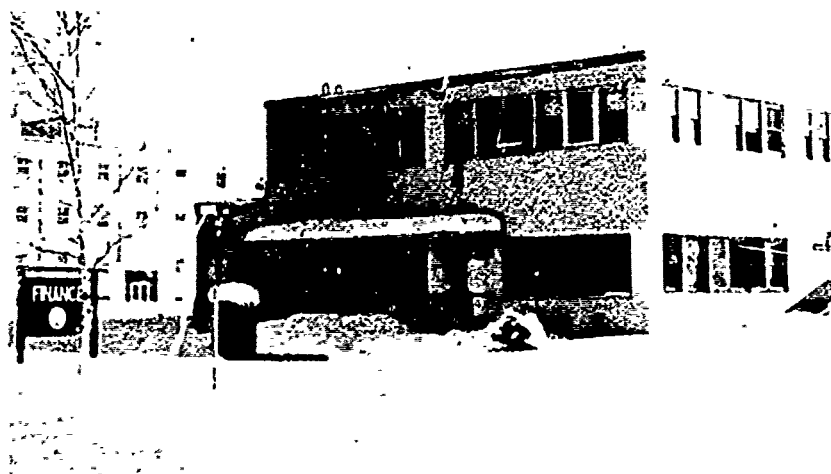


Figure 77. Finance building at right.

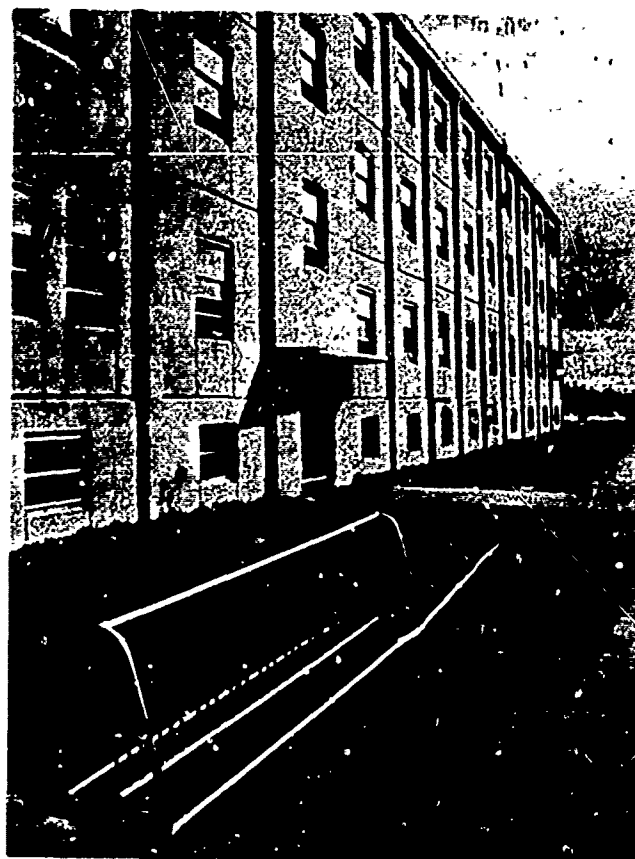


Figure 78. 47th Engineers building.



Figure 79. Bassett Army Hospital.

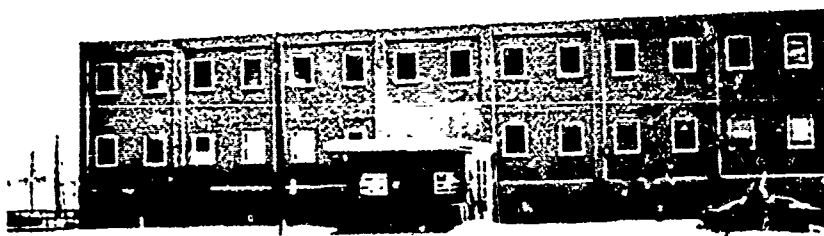


Figure 80. Building shared by CRREL and AMRL laboratories.



Figure 81. IMF buildings.

Methods of study

For the work environments a shortened behavior setting survey was conducted accompanied by some behavioral observation, photographs, and interviews with work personnel. The products were behavior setting data sheets and notes for synomorphic analyses.

Global Comparisons – Authority Systems (DCS Log, AC&W, FAA)

Global comparisons were made among DCS Log and the FAA and AC&W work environments. Figures 82, 83, and 84 show the action pattern and behavior mechanism profiles of these three work environments.

DCS Log is the logistics support service including personnel administration, guest lodging and billeting operations, commissary, food service, clothing sales store, clothing issue point, laundry and dry cleaning, and self-service supply center operation, and the care and disposition of the remains and personal effects of deceased personnel. It also includes transportation services, installation equipment maintenance, and ammunitions storage and control. Excluding troop units, it is the largest work unit at Fort Wainwright.

Action patterns. The *religion* action pattern is understandably zero, or near zero, in presence for all three environments since this kind of behavior would be inappropriate for a work environment.

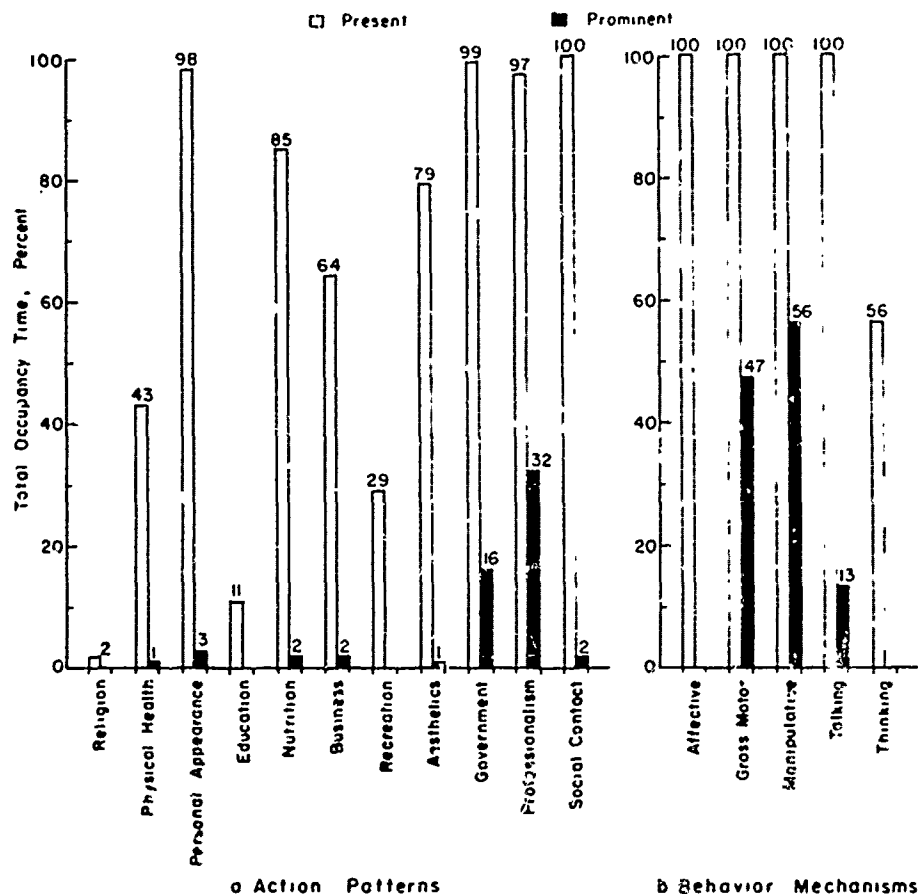


Figure 82. Fort Wainwright DCS Log action patterns and behavior mechanisms.

Physical health is rather high for DCS Log, probably indicating the various safety programs operating there. There is some indication that the moderate physical health score at FAA sites may be explained by similar programs in FAA. AC&W stations have a low physical health profile in the work environment.

Personal appearance is present in the least amount in the FAA, probably because there are no general dress codes or requirements for special uniforms. The personal appearance rating for DCS Log is higher than AC&W because of the stricter dress requirements there. Furthermore, DCS Log is a customer-oriented organization that requires a "dressier" appearance.

Education is lowest as a presence in DCS Log, because there is less on-the-job training compared to both AC&W and FAA, where a fair amount of time is given to OJT and upgrading.

Nutrition is present in nearly all settings in all three environments and the profiles do not discriminate among them.

Business is lowest in the AC&W stations, and about equally present in over half of the DCS Log and FAA settings. This indicates that more things are sold in the latter two environments.

Recreation is low in all three working environments but still twice as high in DCS Log as in the other two environments. This rating raises a question as to whether the higher score may be due to physical spaces provided for recreation in some DCS Log buildings.

Aesthetics is a high presence in all three environments, and it may be high in FAA because of their many maintenance routines which require equipment rooms to be kept clean.

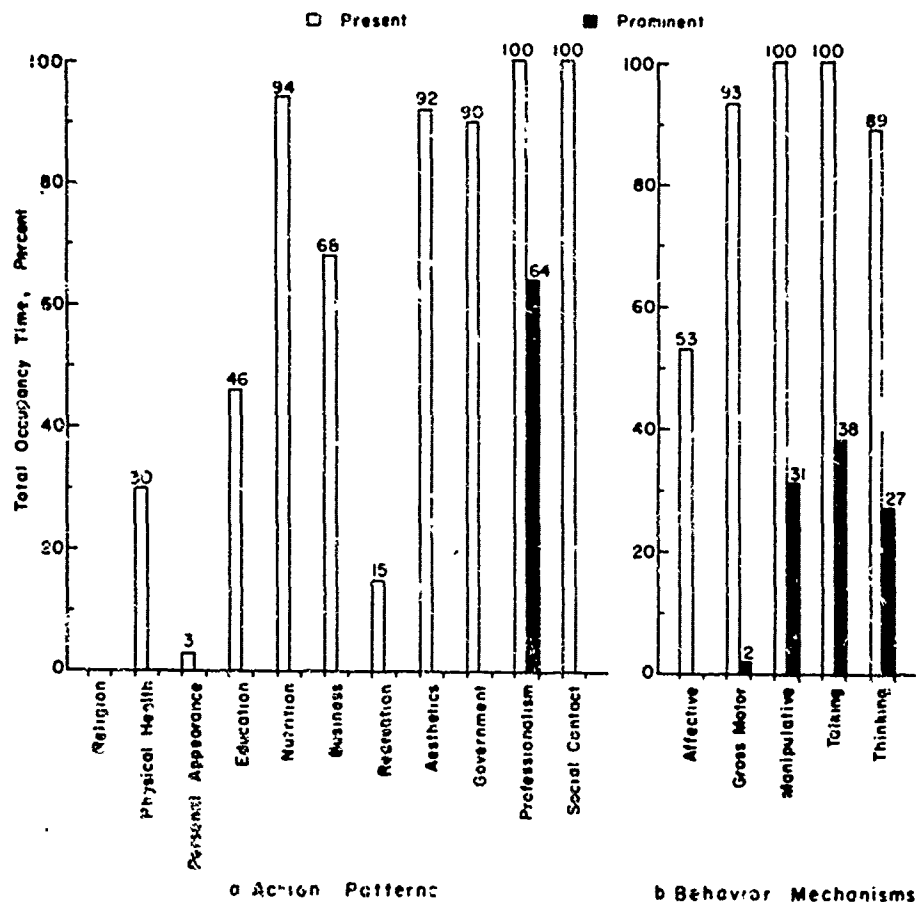


Figure 83. FAA (all stations) work settings action patterns and behavior mechanisms.

Government is present in nearly all the occupancy time of all three environments but it is prominent in 25% of the AC&W occupancy time and in 16% of DCS Log. Both AC&W and DCS Log perform functions that are more directly governmental (for example, enforcing laws) than does the FAA.

Professionalism is prominent in more FAA occupancy time probably because of a greater separation of work and recreation in FAA than in AC&W or DCS Log. The DCS Log rating may be lower because of physical spaces provided for recreation time.

Social contact is present in nearly all occupancy time in three work environments and does not vary among them.

Behavior mechanisms. *Affective behavior* is present in all DCS Log occupancy time, in only half of the FAA O.T., and in three quarters of the AC&W O.T. This would add evidence to the interpretation of DCS Log as more recreative in atmosphere than the other two.

Gross motor behavior indicates that walking or physical exertion is a prominent behavior in nearly half of the DCS Log O.T., about one third of the FAA O.T. and only 6% of AC&W O.T. This means the work settings of AC&W are the most sedentary, which corresponds with observations. FAA work involves more movement and DCS Log work involves movement prominently in nearly half of the O.T.

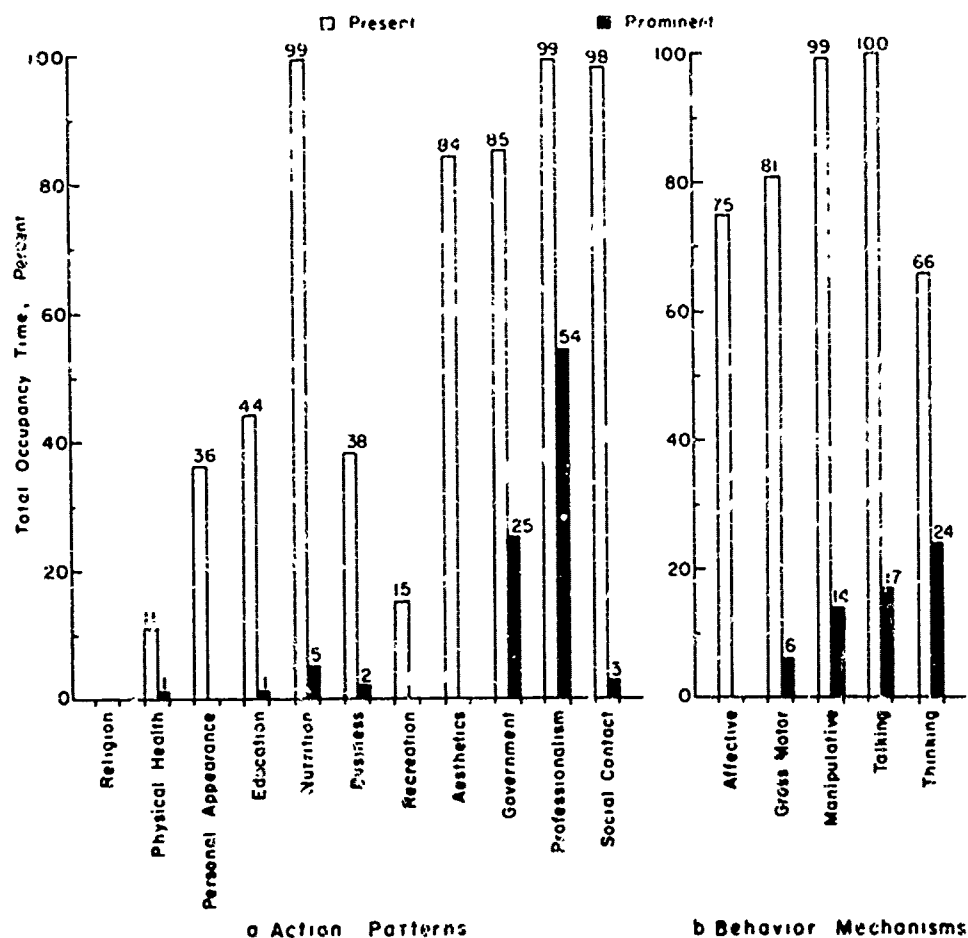


Figure 84. AC&W (all stations) work settings action patterns and behavior mechanisms.

Manipulative behavior is usually indicative of clerical skills like typing, filing, and filling out forms, but it also is rated on such activities as repair and maintenance. As would be expected, DCS Log has more occupancy time with this behavior prominent than the other two environments. FAA has about a third of its work O.T. with manipulative skills prominent because, in addition to the clerical activity, there are also inspection checks, maintenance and repair activities.

Thinking is really decision making, and for DCS Log, most decisions are made at a higher level. About a fourth of both FAA and AC&W O.T. involve decision making as a prominent pattern of their total behavior.

Conclusions. The AC&W stations are a professional, government and decision making environment. The FAA environment is professional and governmental, but also civilian. The civilian environment seems to be characterized by having less prominent government behavior and a lower personal appearance rating.

DCS Log is a more physically active environment than the other two, has a high rating in physical health action pattern and personal appearance (and this is more "military" in a sense) and seems to have more recreation as part of its work environment. DCS Log has a clerical and repair mix of behavioral activities, has low decision making power and is lowest in professionalism.

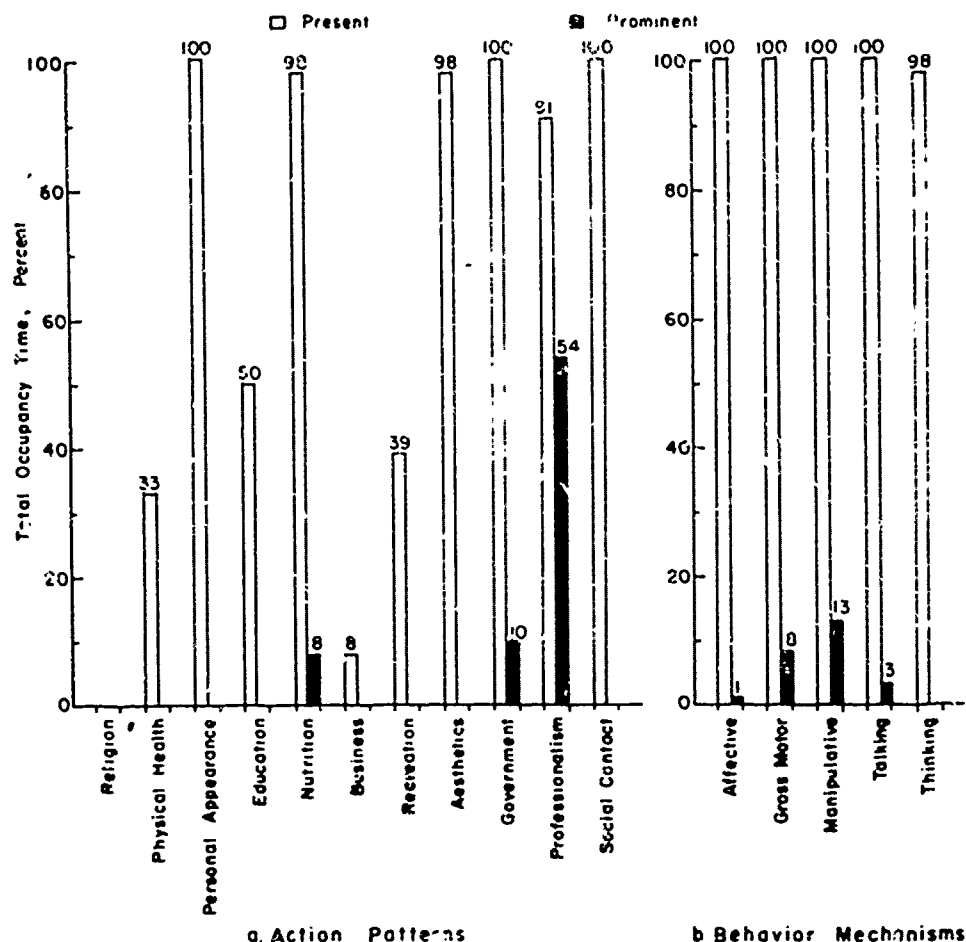


Figure 85. Fort Wainwright IMF action patterns and behavior mechanisms.

Specific studies - Fort Wainwright (IMF, AMRL, CRREL, 47th Eng., Finance, BAH)

Within Fort Wainwright there are a host of individual work environments performing different tasks. Few of these are under the direct authority of the commander since the Fort is considered a subpost rather than a typical post. This means that most units are under control from authorities in Anchorage or as far away as Hanover, New Hampshire. A situation like this causes the superficial appearance of autonomous units, yet each unit operates with many of its decisions made at remote locations, and is, therefore, less autonomous than if it were under the post commander's control.

The specific work units provide a representative mix of the kind of work environments that exist at Fort Wainwright. Units were selected from the largest administrative work unit, Deputy Chief of Staff, Logistics, Installation Maintenance Facility (DCS Log, IMF), the smallest tenant unit, the Alaskan Projects Office of the U.S. Army Cold Regions Research and Engineering Laboratory (USA CRREL), Bassett Army Hospital (BAH), and three other units intermediate in size and scope: Finance, the 47th Engineers, and Arctic Medical Research Laboratory (AMRL). Selection was made also on a basis of availability to the researchers. Given the changing nature of the post a representative random sample was not possible.

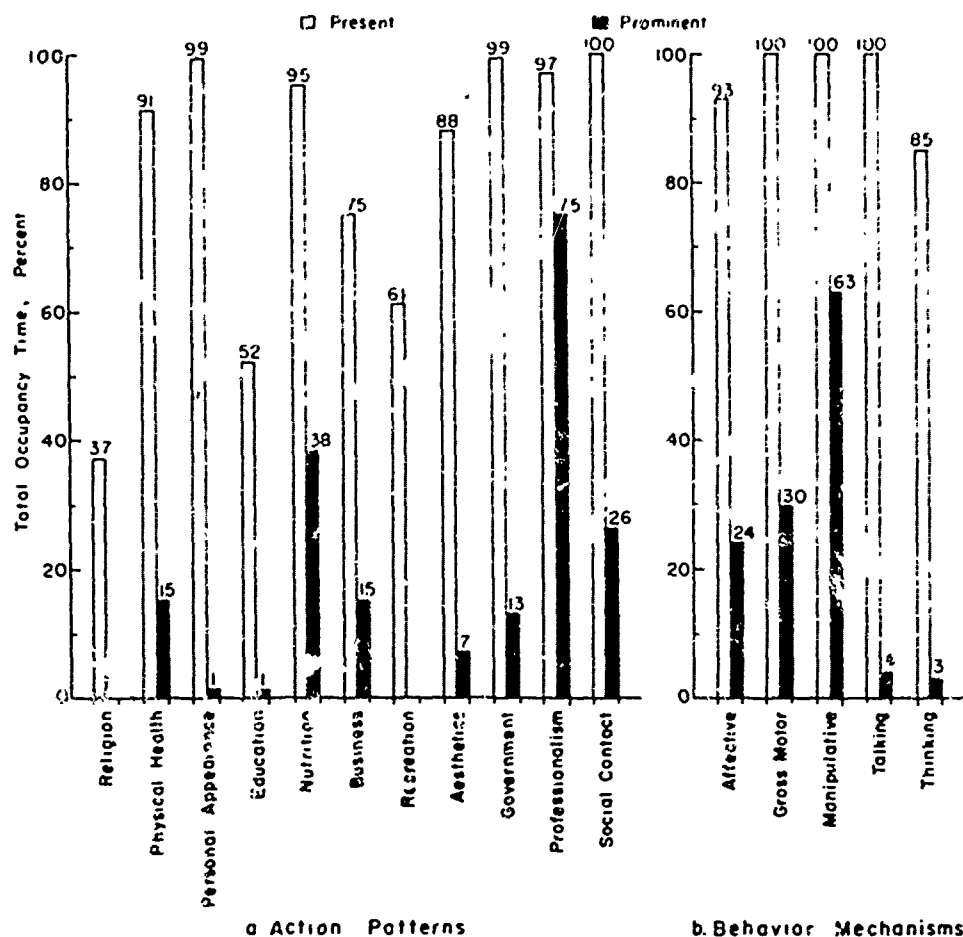


Figure 86. Bassett Army Hospital action patterns and behavior mechanisms.

IMF maintains and repairs organizational equipment which includes office industrial equipment, armament, tactical equipment, personnel equipment, heaters, troop clothing items, etc. IMF is also responsible for surplus equipment. Communication and electronic equipment is maintained and repaired.

47th Engineers performs permanent facility renovation construction including carpentry, plumbing, and electrical work. It is responsible for post improvements and renovation construction. It participates in tactical training maneuvers as combat engineers.

Finance handles matters relating to troop pay. Also included in Finance's responsibilities are collecting for phone and housing payments and dispersing travel pay.

Bassett Army Hospital provides clinic services for medical problems and operative and postoperative care for military employees, their dependents and retired personnel. It also provides emergency care for the Alaskan nonmilitary population.

USA CRRFL performs research and evaluation for cold regions engineering and earth sciences projects. It maintains its own offices and laboratory.

AMRL performs medical research for cold regions. It also performs research and evaluation of cold regions clothing and personnel adjustment.

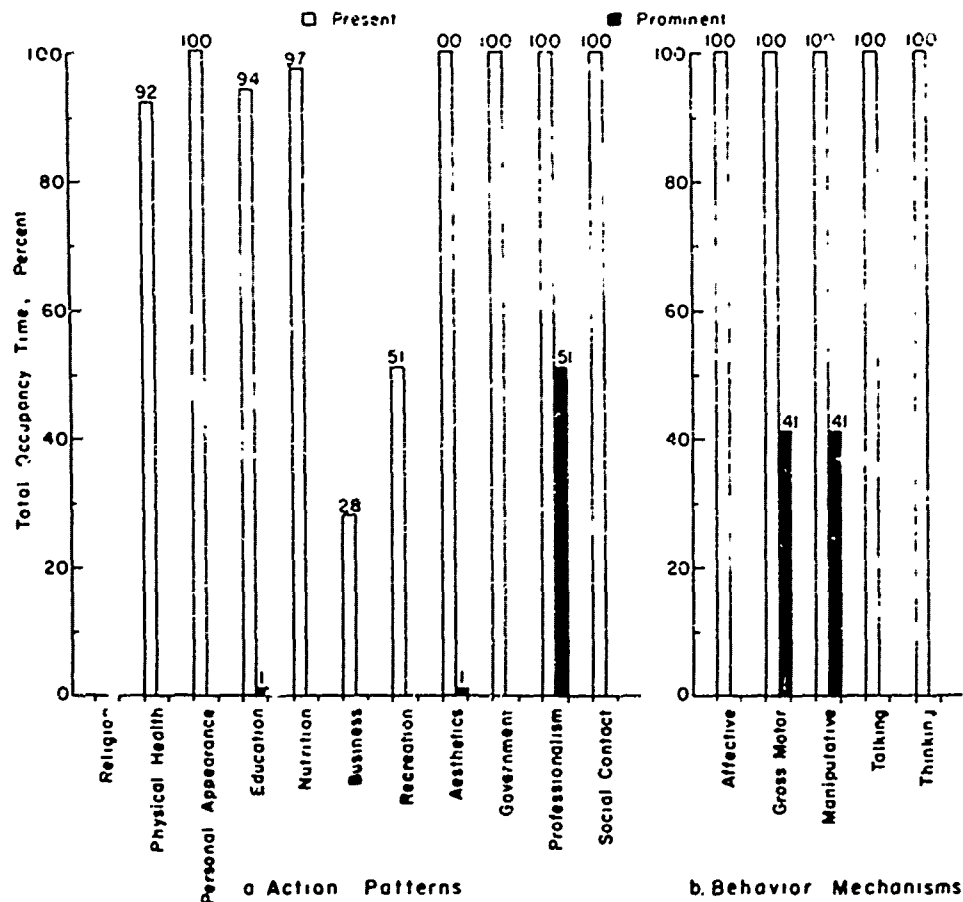


Figure 87. Fort Wainwright 47th: Engineer action patterns and behavior mechanisms.

Methods of study. The methods used for studying the specific work units were exactly the same as those described in the previous sections, with the exception that data on synomorphs are more related to physical aspects of these specific environments than they were in the more general environments previously discussed.

Action patterns (see Fig. 85-90). *Aesthetics* is present more for IMF, the 47th Engineers, Finance and it is somewhat high for Bassett Army Hospital.

This means that maintaining physical appearance is present in more of the O.T. for these settings than for the settings of CRREL and AMRL. The relative lack of aesthetics in the settings of these two agencies may be due to their hiring of only one janitor to clean all their settings, thus reducing the aesthetic presence across settings. It is more typical of the strictly military environments for personnel to clean up their own areas (Fig. 91).

Business is, of course, highest for Finance where bills are paid. It is only scored in other settings where vending machines are present or some form of purchase takes place.

Professionalism is prominent in 75% of the O.T. of Bassett Hospital. IMF and the 47th Engineers have professionalism prominent in about half of their O.T.

Education is present in 94% of the occupancy time of the 47th Engineers, 63% of CRREL's O.T., about half of the occupancy time for IMF and Bassett, and a third of the O.T. for AMRL. These differences are indicative of the varying amounts of on-the-job training, formal classes, instruction and other educational aspects of the various work sites. It is significant that the most mobile work force, the 47th Engineers, has the highest presence of education.

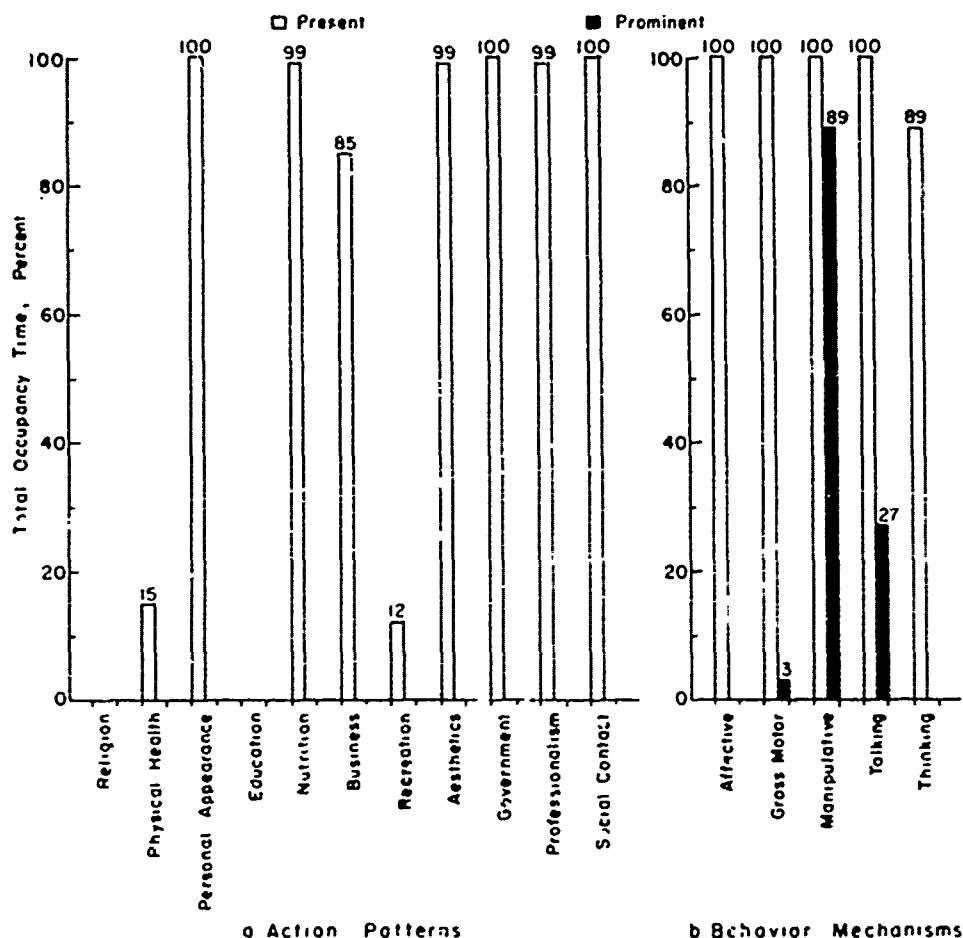


Figure 28. Fort Wainwright Finance action patterns and behavior mechanisms.

The *government* action pattern is prominent in 12% of the O.T. of Bassett Hospital. IMF is the only other organization with prominent O.T. time for government action pattern. All the other environments have 100% or nearly 100% government action patterns present in their O.T.

For the *nutrition* action pattern only Bassett and IMF have O.T. prominent. This is because Bassett has its own kitchen and cafeteria and IMF has special break rooms for snacking.

High presence of *personal appearance* action pattern was noted before as one of the characteristics of a military environment in cold regions.

The *philanthropy* action pattern is also high in military environments because of the high pressure to contribute to organized campaigns. Philanthropy data were not recorded for CRREL and AMRL.

The *physical health* action pattern is highly present in O.T. for the 47th Engineers, Bassett Hospital and AMRL, for different reasons. Bassett and AMRL being medical organizations. It would be expected that the physical health rating should be high, and these are the only organizations where this action pattern is also prominent. The 47th Engineers work out-of-doors in the cold and work with heavy equipment. Therefore, safety and health programs are encouraged.

The *recreation* action pattern is about 50% present in the 47th Engineers, slightly higher for AMRL, and highest for CRREL. Lowest are IMF and Finance. Recreation in a work setting can be considered a rough index of non-working or leisure behavior and the organizations can be ranked accordingly on this rating scale.

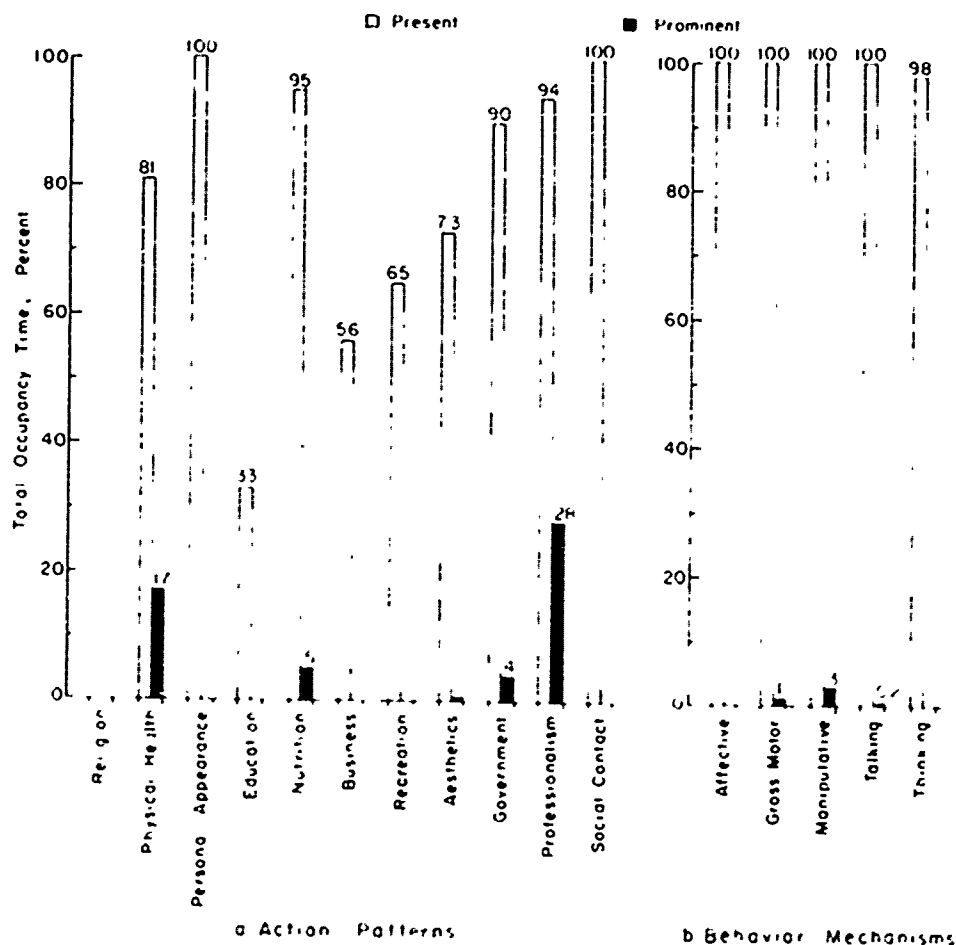


Figure 89. AMRI action patterns and behavior mechanisms

The *religion* action pattern is, as expected, at a zero level for all the work environments.

The *social contact* action pattern is uniformly 100% present in OJT for all the work environments and does not discriminate among them.

Behavior mechanisms. *Affective behavior* seems to be uniformly present across all environments, but is not prominent in any.

Gross motor behavior is present in all environments 100% of the time but only prominent in Bassett and the 47th Engineers. Bassett scores highly because of the amount of walking that goes on in a hospital, and the 47th Engineers environment involves the extreme physical exertion of construction activities.

Manipulative behavior involves use of the hands. It is present 100% of the time in all environments but is highly prominent behavior in Finance, Bassett, and the 47th Engineers. Finance has the highest scores because of the amount of typing, handling of forms, and clerical work that goes on there. 47th Engineers has scores about half as high, because of the use of the hands in construction. IMF has a small prominent score for its clerical and repair sections (Fig. 92).

Talking behavior is highly present in all environments but prominent only to a significant degree in Finance and CRRII. This may correspond with the high recreation score in CRRII but is related to the type of work in Finance which deals with customers paying bills.

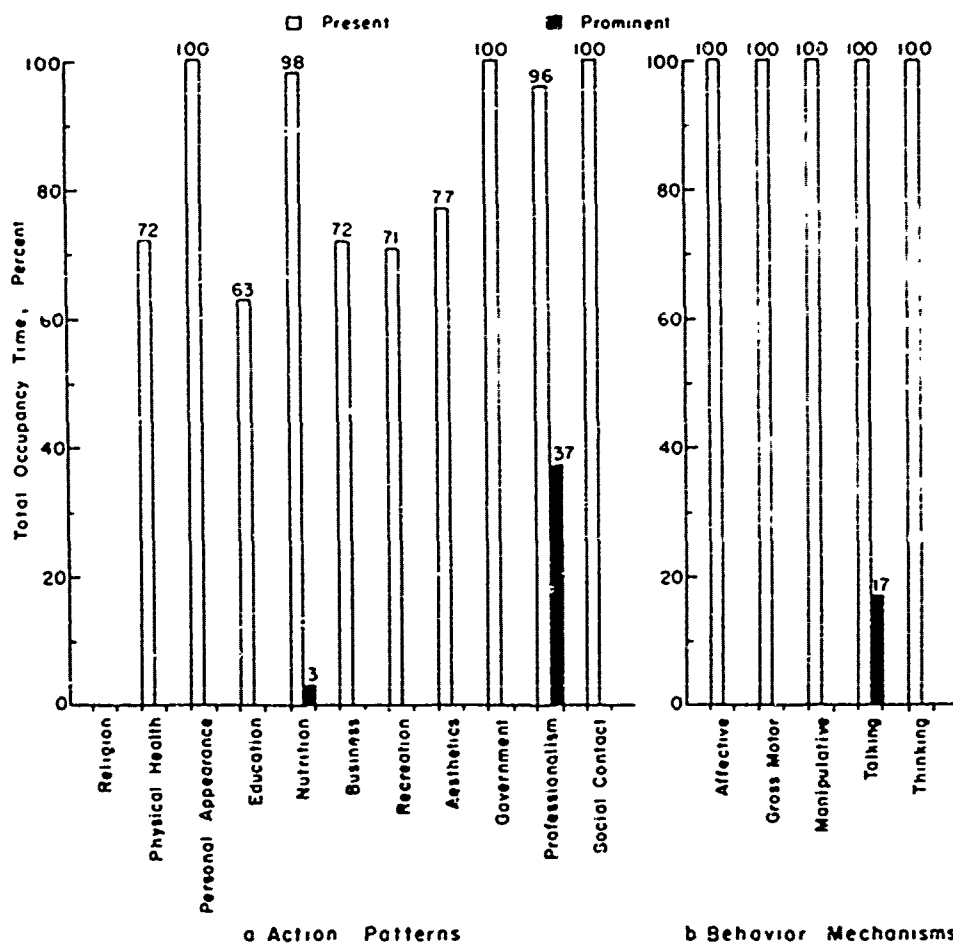


Figure 90. CRRFI action patterns and behavior mechanisms.



Figure 91. Cleaning the floor, a weekly activity.

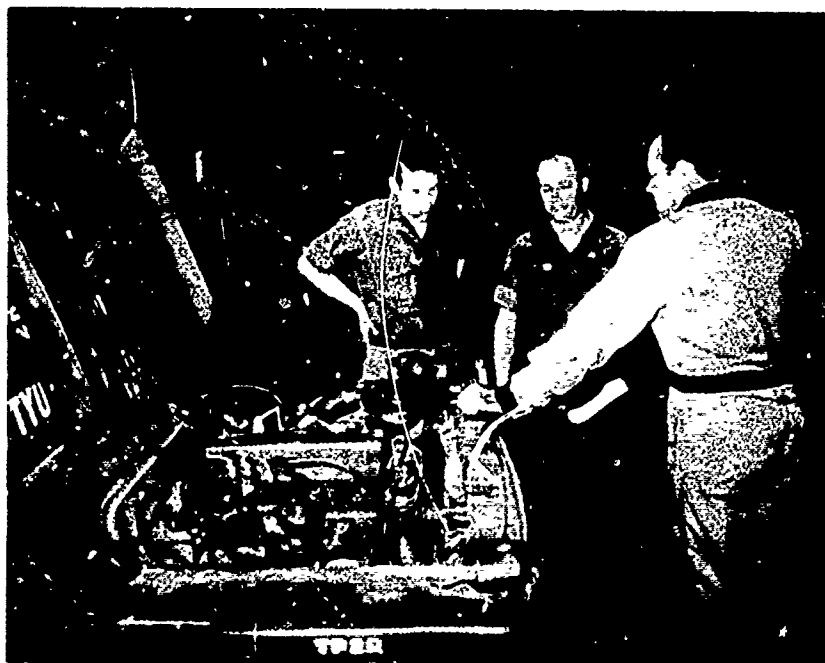


Figure 92. Repair work at IMF.

Thinking behavior is uniformly present in all environments but not prominent in any. This is characteristic of lower-echelon work units in the military.

Other measures. *Autonomy* measures the level at which basic decisions are made as to wages, prices, who can be present in the setting, and selection of performers and programs (see Barker 1965, p. 76 or App. A). Figures 93-98 show the distribution of autonomy scores for the settings of the six work environments.

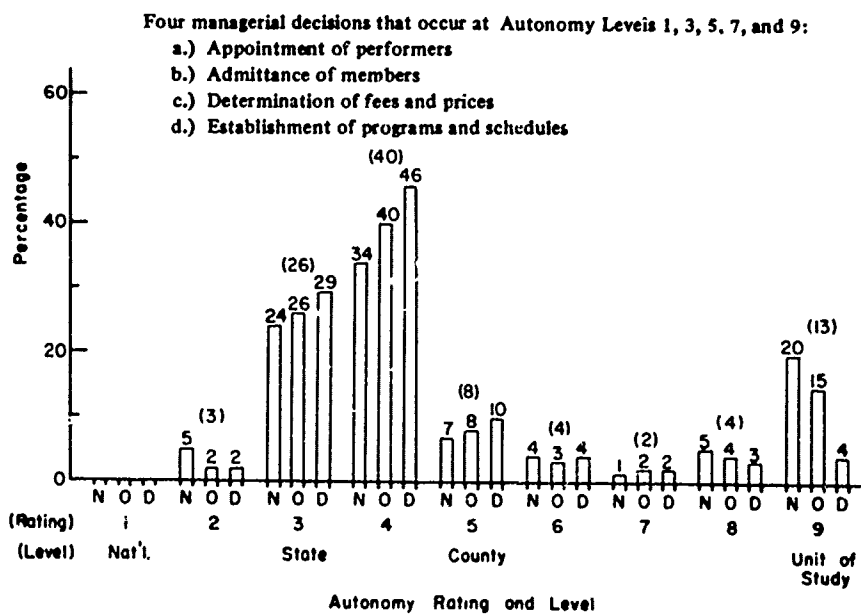
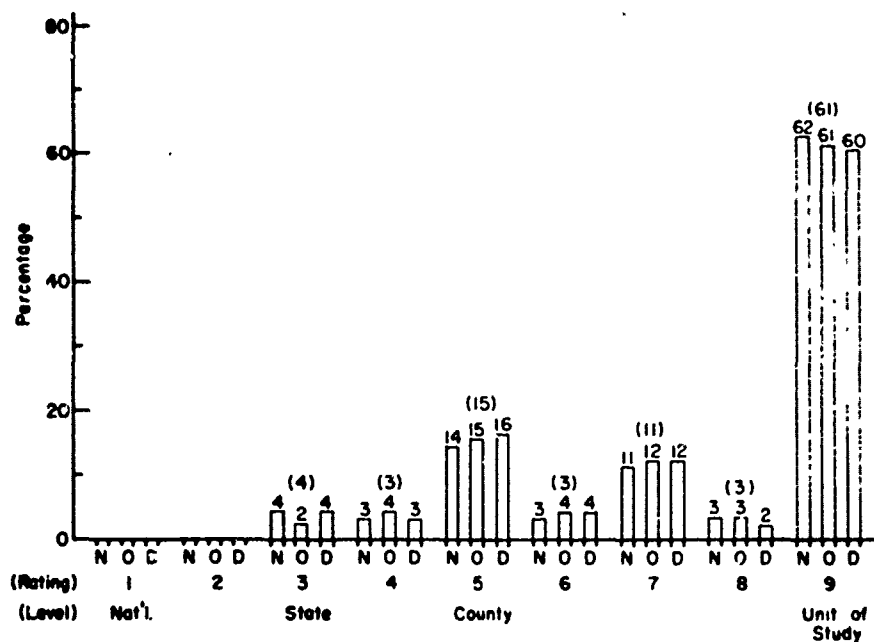
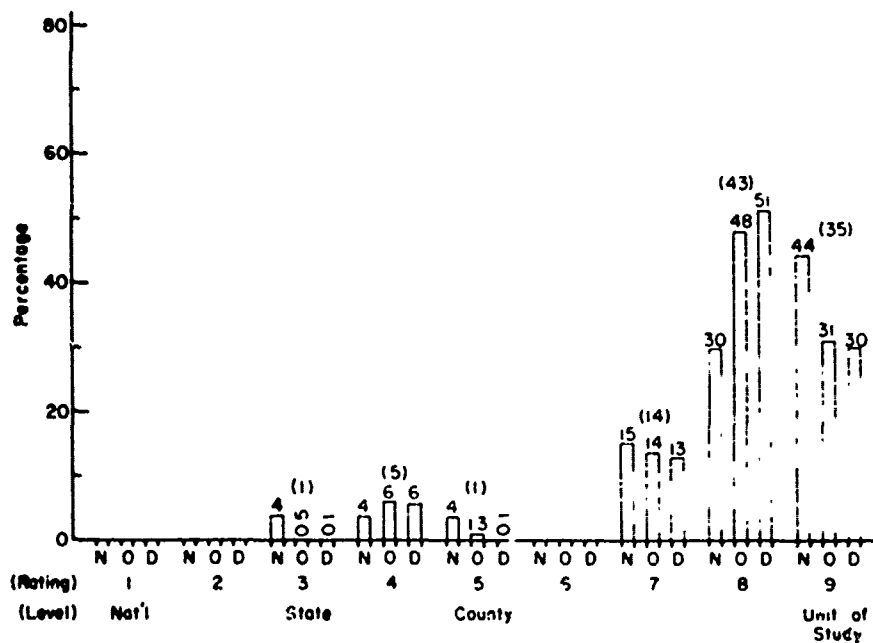


Figure 93. For: Wainwright IMF autonomy levels with percentage totals for number N, occurrence O, and duration D.



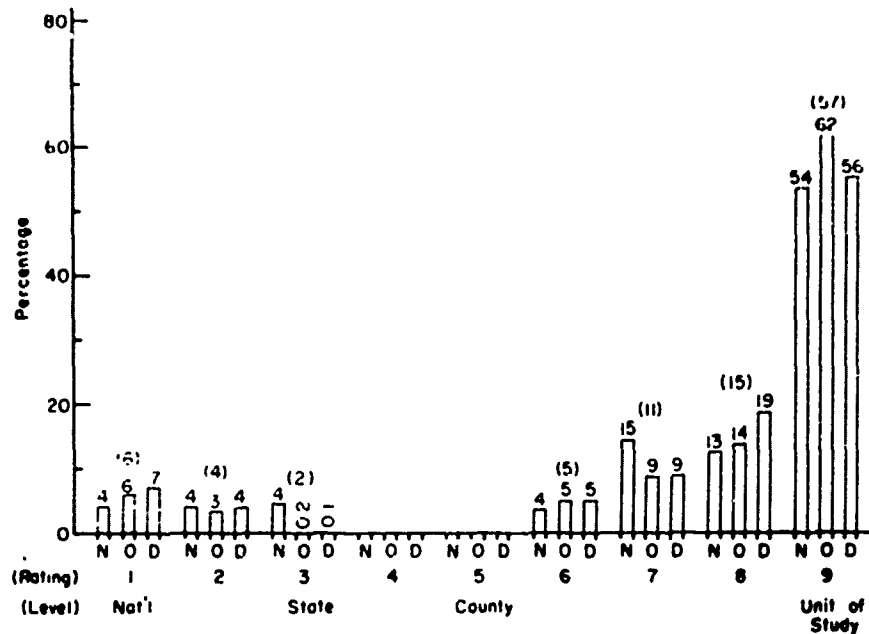
Autonomy Rating and Level

Figure 94. Bassett Army Hospital autonomy levels with percentage totals for number N, occurrence O, and duration D.



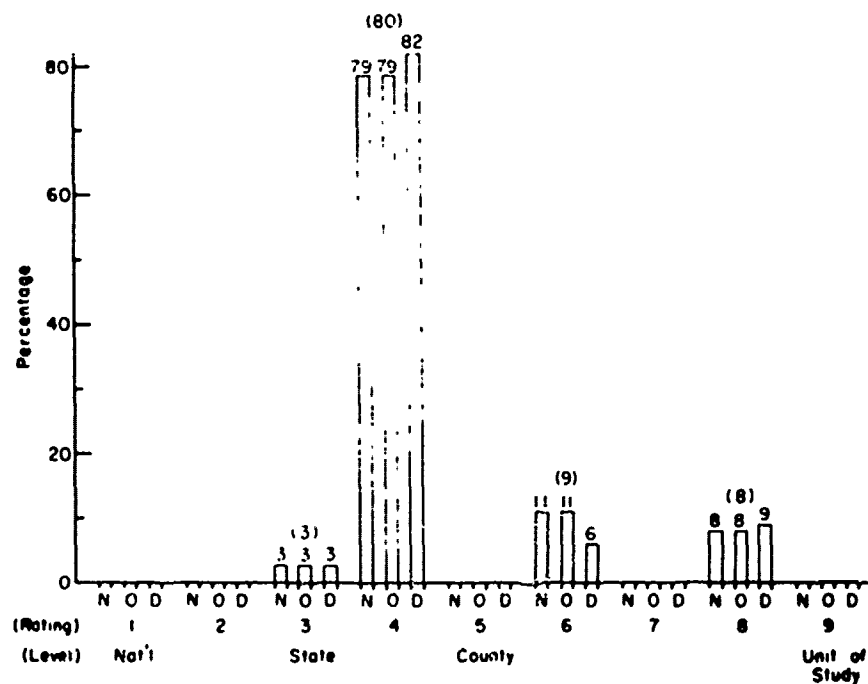
Autonomy Rating and Level

Figure 95. CRFEL autonomy levels with percentage totals for number N, occurrence O, and duration D.



Autonomy Rating and Level

Figure 96. AMRI autonomy levels with percentage of totals for number N, occurrence O, and duration D.



Autonomy Rating and Level

Figure 97. Fort Wainwright 47th Engineers autonomy levels with percentage of totals for number N, occurrence O, and duration D.

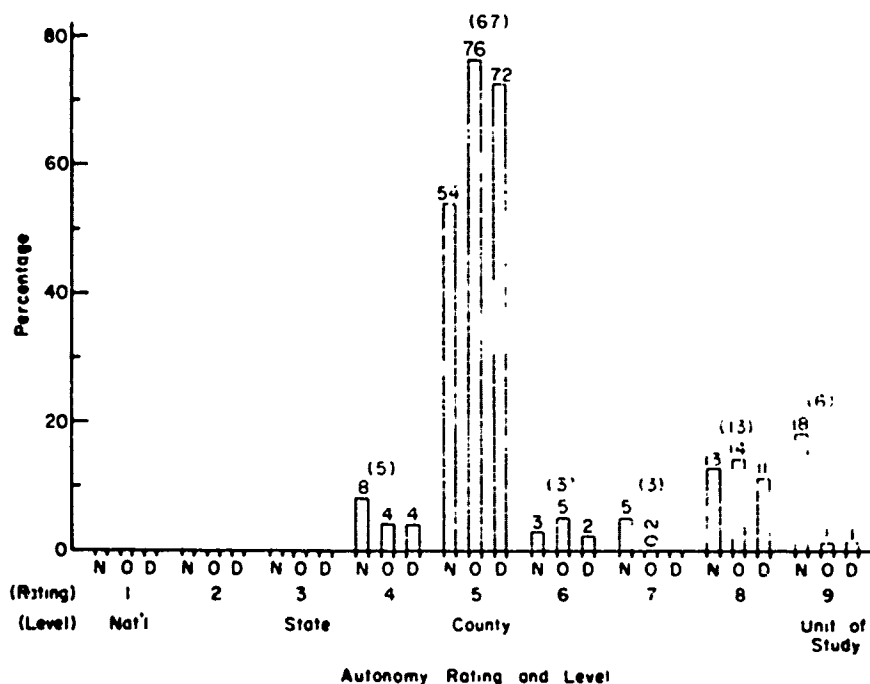


Figure 98. Fort Wainwright Finance autonomy levels with percentage of totals for number N, occurrence O, and duration D.

The autonomy levels show that 47th Engineers, IMF and Finance have relatively low autonomy levels while CRREL, AMRL and especially Bassett have high levels. This means that the latter three organizations have a relatively high degree of freedom in their own affairs while the first three have their decisions made at the USARAL (US Army, Alaska) level in Anchorage.

GRI. The organization with the highest richness index is the 47th Engineers (17.43) while the lowest index is AMRL's (7.44). The remaining organizations have indices near ten: CRREL, 12.73; IMF, 10.58; Finance, 10.71; and Bassett 10.35. Richness is derived from varieties of behavior and different kinds of people. Whether one values an environment as "rich" or not is usually arbitrary, but in cold regions where many resources are scarce, richer environments may help to make up the sensory deficit.

Isolation behavior settings in each of the work locations were given an "E", "O", or "I" rating, depending upon whether they were *excursive*, *on site*, or *incursive* settings. The percentage of excursive or incursive settings can be considered a measure of isolation. Table XIII shows the number and percentage of these kinds of settings. According to these data AMRL is the least isolated, with 18% of its settings either excursive or incursive. However, because of the large number of untabulated excursive settings for both AMRL (300+) and CRREL (220+), they are both candidates for being the least isolated.

Conclusions. Of the work environments studied, IMF seems to be the most controlled, the most conforming to government regulations, and in the middle range of the various activities measured.

The 47th Engineers is the least controlled, the most active, the most safety conscious. It is also the most mobile of the six environments, according to the action pattern data. Bassett Army Hospital is the most professional environment and the second most physically active. Naturally it is highly concerned with physical health.

Table XIII. Number and percentage of excursive, on-site and incursive settings for Fort Wainwright.

Organization	Excursive Settings		On-Site Settings		Incursive Settings	
	N	%	N	%	N	%
DCS Log	20	2	939	97	12	1
IMF	2	2	76	92	5	6
47th Eng.	0	0	38	100	0	0
CRREL*	0	0	22	100	0	0
AMRL*	4	8	42	82	5	10
DAH	6	3	184	96	1	1

*These data are misleading because the number of excursive settings for CRREL and AMRL were in the hundreds. Excursive settings for other organizations are more accurate. CRREL's estimated excursive settings were 200+, AMRL's 300+. Thus, both organizations have more settings outside their work location than any other organization.

By contrast, the 47th Engineers do a lot of work outside their buildings but are seldom if ever off post in a work setting.

Finance is the environment using manipulative skills the most and has the highest level of talking.

AMRL is the least rich environment but also the least isolated, having many visitors and excursive trips.

CRREL is the working environment with the highest proportion of recreation present in its total occupancy time, indicating that it is the work environment people enjoy the most, and it is also next to the least isolated with most of its settings off post.

Habitability requirements

Noise interference. In regard to work environments, the negative item most mentioned by respondents was the noise interference with work. Noise originated from telephones, typing, and conversation, and this condition was exacerbated by a lack (or partial lack) of partitioning and a lack of acoustical treatment of floors, ceiling and walls. Subjectively, at least, workers in many areas felt that the noise level was too high for tolerance (Fig. 99).

People interference. Two kinds of people interference were observed: employees socializing within the work area, and customers coming into the work area because of poor control of the customer area. In two areas of DCS Log operations it was noted that the addition of counter areas greatly alleviated the latter problem (Fig. 100).

Lack of autonomy in each section and unclear lines of authority caused customers to travel to too many areas before finding the right person to deal with. This added greatly to the interference with work. It was also true, in some cases, that several persons needed to be seen to complete the customer's business.

Providing specific areas for socializing, eating and recreation may appear to cut down recreation presence in work settings (for example, IMF's low score on recreation, Figure 101, because it channels recreation into these areas). Yet, by observation, IMF did not appear to have less employee interference with work than other units.



Figure 99. Talking at the office break in IMF building. Note closeness of desks, lack of partitions, and non-acoustical treatment of floors.

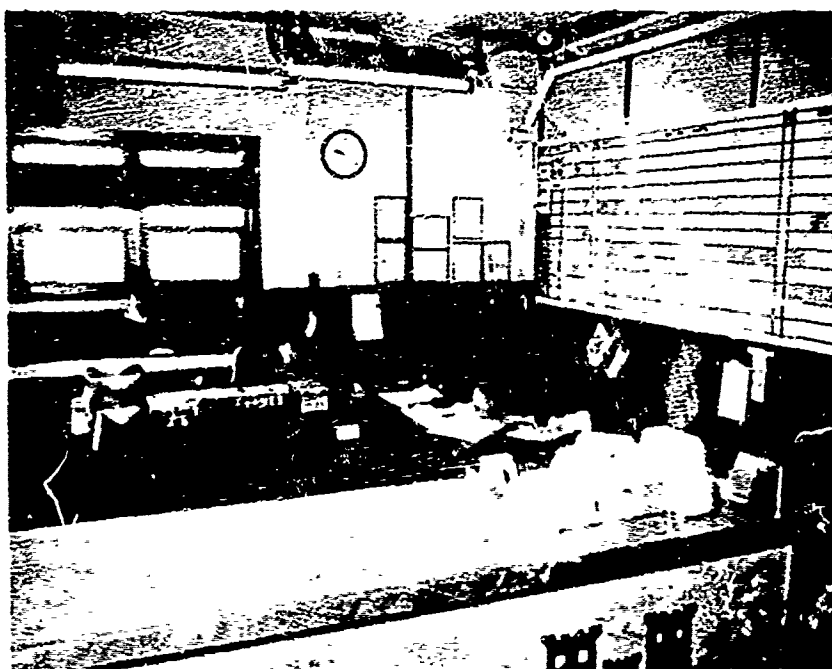


Figure 100. Counters separating customers at IMF.



Figure 99. Talking at the office break in IMF building. Note closeness of desks, lack of partitions, and non-acoustical treatment of floors.



Figure 100. Counters separating customers at IMF.

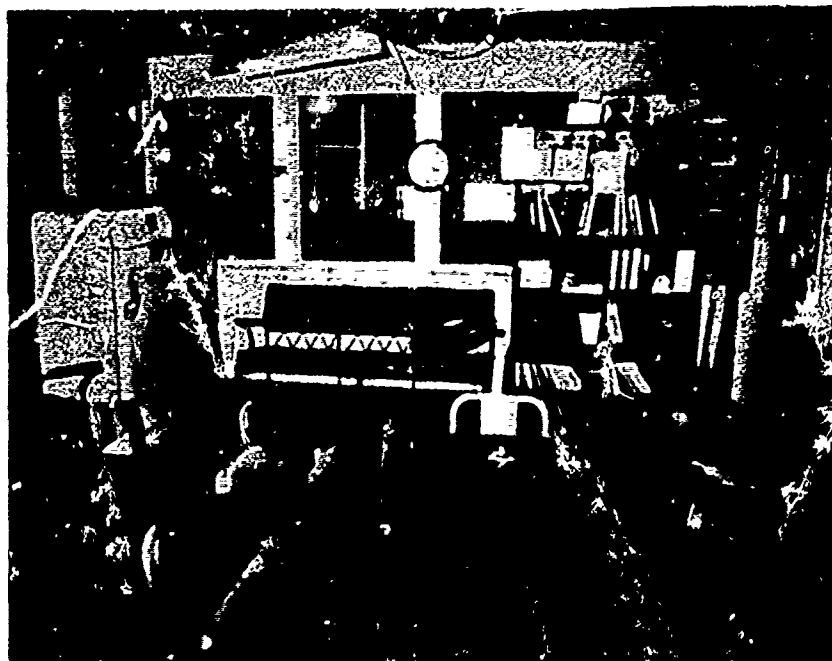


Figure 101. Break room for transportation maintenance facility.



Figure 102. Improper lighting. Note fluorescent lights in ceiling all around work area but inadequate light for the desk.

Heat control. Work buildings did not appear to suffer from the otherwise universal overheating found in housing. Temperatures had high variability, some places being too cold, others too hot, and still others with cold floors and hot ceilings. The common denominator seemed to be lack of control. Many workers tried to compensate for this by bringing their own electric heaters to work or by opening windows.

Lighting. In almost all cases lighting seemed adequate but, similar to the housing, a lower general intensity could be profitably maintained if certain tasks were lighted specifically. This might make a considerable savings in electricity in the dark winter days (Fig. 102).

Personalization of space. In conjunction with earlier studies, it was observed by some supervisors that workers who personalized (or were encouraged to personalize) their work areas seemed to take more interest in arranging the furnishings to improve work output. This may be due more to management than personalization of space, however.

Habitability guidelines

Enough examples of office landscaping and open office plans exist (Howard 1972, Kaplan 1974, Bach 1974) so that detailed drawings do not need to be shown.

Noise abatement. Most office spaces seemed to follow the landscaped office plan with 6-ft-high partitions available in government stocks, yet none of this was done with consideration for noise abatement.

Necessities for noise abatement are carpeting, acoustical ceilings, drapes on windows and acoustical wall coverings. Typewriters and other loud office equipment should be shielded by strategically placed partitions, and these partitions should be oriented to block sound from the adjoining person. Telephones should have suppressed buzzers instead of bells.

Hallways, notorious for channeling noise, should also be acoustically treated. It would also be possible, in some places, to knock out hallway walls and provide a more open office.

Control of employees and customers. Lack of direction in being able to find the right person is one of the biggest causes of people interference. In addition, having to constantly move offices and work locations seems to be commonplace in the Army. Moving office locations is costly and work-interfering.

One solution to these problems is the open office plan. Research shows (Howard 1972) that the chief advantage of the open office plan is in saving the cost incurred from frequent moving.* Also, having an open office with clearly readable signs would permit a visiting customer to see where he needed to go without having to interfere with other workers. Counters would be required to keep the customers from entering the work area.

Heat control. Heat control under the open office plan would become more centralized because of the large free space in which air could circulate.

Lighting. Lighting in the open office would need to be centered around work spaces with movable lamps and/or overhead lighting bars.

Work space. Work spaces could still be personalized with partial partitions, and placement of filing cabinets and other devices for defining space, such as places for plants, pictures, etc. Supervisors' work spaces should have glass or open areas where the various work environments under supervisory control would be visible.

Industrial doors. Industrial areas commonly have overhead doors that face to the north. This makes for greater ice buildup around the door, blocking it open. Such doors should be located on the south side of the buildings to take advantage of the sun's warmth.

*The reader should note that open offices are not necessarily more efficient.

Since many industrial locations need to have large doors to receive large pieces of equipment, radiant heating in the floor is necessary. Overhead industrial heaters alone were found to be inadequate in every location studied: Army, Air Force and FAA.

Mobile industrial units. Any industrial unit that requires travel in the cold weather utilizes Army or civilian equipment that often hinders performance. For example, IMF has half of its operations 2.8 miles away on South Post. This is in contrast to DCS Log warehouse No. 1 where most of the activities are under one roof.

There is a lack of planning for vehicle electrical plug-in units at various sites, and the heaters in vehicles are not adequate for the Alaskan climate. Fire engines, designed for warmer climates, do not permit more than three firemen to ride inside, and it is impossible to ride outside in the Alaskan winter. In the winter extra vehicles must be used to carry the firemen to the site.

Heating units in all vehicles were mentioned as one of the common causes of frostbite. The units break down in cold weather and are not easily repaired.

In the same way that the housewife is discouraged from moving about because of the vehicle problems, so are personnel who must conduct business discouraged. Knowing that there are no plug-ins will discourage personnel from a site. Also having a bad automobile heater, an all too common occurrence, will keep personnel indoors. What is clearly needed is a better designed heating unit for vehicles in the Alaskan cold, and centralization of functions to reduce travel to a minimum.

PART IV. CONCLUSIONS AND RECOMMENDATIONS

TEST OF RECOMMENDATIONS TO SATISFY HABITABILITY REQUIREMENTS

Review of existing buildings. The habitability requirements and guidelines discussed in this report do not become criteria for design until they have been scientifically tested. The validating of the criteria requires a pre-construction measure in the field followed by a post-construction evaluation. Presumably the researchers who do the evaluation will also be able to work with the architects in order to determine how closely the final design resembles the habitability requirements so far researched. Should this aspect not be possible, the evaluation would be seriously handicapped.

Before field testing, however, it would be necessary to review previous designs of the buildings in question. If family housing, for example, is to be tested, all of the most recent designs of family housing will need to be reviewed before considering how the habitability requirements of this report are to be applied to renovations of new construction.

In order to save implementation lead time required, it would probably be best to begin such a project as soon as possible.

Types of implementation. Implementation can be done with either new construction or renovation of existing facilities. However, because of the lead time required, renovation could proceed much sooner.

From one point of view it might seem that renovation would provide a more critical testing of criteria because only a few aspects could be tested at once. This, of course, would provide essential data. However, it is only in new construction that a test of all the new requirements can be done as an interaction. Interaction effects are quite critical in statistical testing of differences in behavior.

Evaluation. Postconstruction evaluation is the final test of the habitability requirements in any design. Only after people have lived in the designed structure for a period of a year or more can it be evaluated from a behavioral standpoint. Just one evaluation of a design is not sufficient to demonstrate its efficacy. The design structure should be tested with several different populations and at different locations. These follow-ups after the original postconstruction evaluation would not need to be very elaborate. In fact, they could be simple interviews after construction to determine whether the findings of the original post-construction evaluation still held.

Deliberately undermanning a post design

Selecting a location. The data from the cold regions project so strongly reinforced Barker's undermanning theory, by demonstrating the advantages of smaller installations, that a logical next step would be to determine whether a large post could be deliberately undermanned by effectively turning it into several small posts without lowering the population level. This strategy would attempt to remove many of the liabilities that accrue to larger military installations. The post selected would not need to be in cold regions, since undermanning is applicable to any location, but it would need to be large enough (with several thousand men) to have endured the effects of overmanning.

Implementation. Implementing an undermanned environment in a large post would require a radical change in the way Army posts are currently managed. Presumably the implementation would proceed in stages. If the post were highly dispersed, then it could be broken up into territorial units, each with its own recreational and other facilities. If not dispersed, the reorganization would be done by a decentralization of recreational function and reassignment to specific areas.

Recreation would be the first reorganization, followed by other aspects of post life depending upon local conditions. Undermanning would probably require several years in order to demonstrate its effectiveness.

Synomorphic analysis. One of the methodological findings of the project was that elements below the behavior setting level, i.e. synomorphs, have no systematic framework for analysis. The researchers attempted to organize synomorphs around the K-21 scale, but more work needs to be done to determine whether this is feasible.

In order to develop the framework for synomorphic analysis, a single building would need to be studied, beginning with a complete K-21 rating of all settings and proceeding to identify every synomorph and the hierarchies of synomorphs.

Research in other work and recreational environments. The research done in this project needs to be carried out, to a more detailed conclusion, in other work environments such as hospitals, kitchens, radar rooms, maintenance shops, warehouses, laundries, and aircraft hangars. There was not time to cover these work environments sufficiently to bring out habitability requirements.

Perhaps the most important work environment that needs to be studied is the field operation of troops. This is the central mission of the military in cold regions but no data exist on how environmental design can influence performance. The research has uncovered deficiencies in arctic clothing and field vehicles, but these are only two facets in what would amount to a totally different environment.

The design of recreational buildings is an area that needs to be covered in future research. Many of the current assumptions seem to be that these buildings need to be little more than shells to house various standard events. The fact that they are not fully utilized may be largely due to influences outside the particular building design, but the habitability requirements of such buildings are not known.

Service buildings, such as the PX and commissary, though studied fairly well, proved to require a great many changes. These changes need to be tested along with new concepts of service delivery from previous research (Lozar 1974).

Research on site planning. The most important concept to be tested for site planning is the central location of services proposed in this report. Because new posts are very rarely built, it is important to attempt implementation on present sites that are relocating housing, cutting troop strength, etc.

Females at Fort Wainwright. One of the results of interviewing female soldiers at Fort Wainwright is the recognition that they are not integrated into troop units or operations. The females are treated with such special care that it would be impossible to include them under actual combat conditions. Clearly, research is needed to determine how females can be integrated into Army operations.

Diurnal rhythms. One of the least understood of the influences of cold regions on human behavior is the fluctuation of diurnal cycles. While most personnel recognize the depressing effect of the long winter nights, the equally disturbing long summer days are not recognized as a problem. The researchers uncovered a difference in response to diurnal rhythms between men in the barracks and men in family housing. Men in the barracks tended to go along with the diurnal rhythms while men in family housing had to stick to a time schedule. It is not known which is the better adjustment. Men in the barracks reported more dissatisfaction with various aspects of life, but this is normal for single men as opposed to married, and certainly cannot be attributed to diurnal rhythms.

The effects of diurnal rhythms on design are evident. The recommendation for sun blackout shades came from the expressed need of residents. Some even buy them for their own use. Others try to make do with what shades there are in the dwellings.

It might be beneficial to barracks troops to maintain an artificial diurnal cycle indoors, but this must remain speculation until research can be done.

Remote stations

Implementation. The problems of remote stations are fewer than those of the more populated posts, but the habitability requirements need to be tested there too. The concepts of AC&W station design, i.e. focal points and clusters, need to be deliberately designed into the new sites and evaluated with the same pre-post evaluation scheme described for the Army.

Females at remote stations. Air Force personnel spoke of the possibility that female personnel might be sent to remote AC&W stations. Research needs to be done both on how females would be selected for these jobs and how they could be accommodated on site.

CONCLUSIONS

The most salient characteristic of the military environments was the temporary nature of the military employees and their dependents. They felt no long-term commitment to cold regions which resulted in life styles that were considered quite undesirable. They made an unsuccessful attempt to imitate the lifestyle they experienced in the temperate climates. They were not willing to meet the expense of adequate clothing and vehicles to withstand the rigors of the cold climate nor accept the way of life of those who enjoyed the Arctic and Subarctic. In contrast, the civilian FAA employees were volunteers to Alaska and successfully made the commitment to the cold regions way of life.

The small remote stations, both FAA and Air Force, offered a significant advantage over the large installation which was near a population center. This advantage was the greater number of leadership opportunities at the small site. A greater percentage of the population of the small sites was able to assume greater job responsibilities than their peers at the large installations. Furthermore, occupants of the small installations participated more in recreational and other activities than did the occupants of the large installations.

In the measure of richness, the FAA stations scored highest and the AC&W stations scored lowest. However, the large Army installation would have scored lower than the AC&W stations, were it not for the family housing portion of the Army post.

Habitability guidelines were developed for minimal remodeling, major remodeling and new construction of the family housing, transient housing, barracks and work environments of the Army post. A prototype design was also developed for the remote AC&W station. The results of this research show that architectural design significantly influences user behavior. This influence is so significant in some instances, that immediate application of the habitability guidelines can improve environmental conditions now contributing to unsatisfactory home life, boredom, inefficient industrial operations, unsatisfactory customer service, limited use of recreational facilities and poor command leadership. In most cases, the habitability guidelines constitute no greater expense than the ineffective designs now being executed.

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APPENDIX A: THE DEVELOPMENT OF ENVIRONMENTAL CONCEPTUAL SCHEMES FROM THE RATING SCALES.

Previous chapters have described the rating scales used for each behavior setting in an environment. As these scales have been used in various environments, certain relationships have been discovered that have led to rather general environmental diagnoses. Some, such as the undermanned environment, are more developed than others, but the possibility of discovering many more exists as behavior setting surveys are extended to new and different kinds of environments.

The concepts of undermanning, leadership, crowding, and environmental regression are derived from the penetration level measures

The undermanned environment. Barker (1960) first reported his concept of the undermanned environment when he discovered an interesting discrepancy in his data between the behavior of the Kansas town, Midwest, and an English town, Yoredale. Although Midwest (715) had only about half of the population of Yoredale (1300), it had 1.2 times as many behavior settings. This aspect of the undermanning theory led to the discovery that *larger organizations, in general, have fewer settings per population than smaller organizations*. Data from schools (Barker and Gump 1964) and churches (Wicker 1969) tended to confirm this finding. Large organizations tended to have too many people for each setting, or were *overmanned*, while the smaller organizations had too few people per setting, or were *undermanned*.

A second aspect of the undermanning theory had even larger ramifications in terms of environmental pressures. Since the larger organizations had fewer settings per population, there was less pressure on the persons in each setting to participate. Conversely, in the smaller, undermanned settings there was a great deal *more* pressure on persons in each setting. But the consequences are far wider. Barker and his associates compared undermanned settings with *optimally* manned settings, settings that were neither overmanned or undermanned but had just the right number of persons in the setting. Barker (1968, p. 198-201) lists no less than 24 consequences of being in undermanned settings as opposed to optimally manned ones. These consequences of being in an undermanned environment include:

- Twice as much pressure to take part in programs,
- Holding 2.5 times as many responsible positions,
- Being absent less,
- Quitting jobs and positions,
- Being more punctual,
- Volunteering more often, having broader core conceptions,
- Being more interested in the affairs of the setting,
- Having more frequent liking of fellow members, and being more satisfied and finding work more meaningful.

Clearly, the influences of an undermanned environment are quite different from those of an overmanned and an optimally-manned one. The research is backed up by scores of research studies listed in Barker (1968). Since the publication of Barker's results, Wicker (1968, 1969) has expanded the findings of the undermanning theory and conducted an experiment which demonstrates that undermanned settings are more likely to accept unqualified members than optimally manned settings (Petty and Wicker 1971).

Much research needs to be done on the concept of the undermanned environment but it seems very clear that undermanning is an extremely useful tool for design concepts. The general principle seems to be that if one wants to redesign an environment where lassitude, absences, and lack of satisfaction are the rule, he programs an undersupply of persons for the tasks defined by the environment. The prescription is measured quantitatively by penetration levels. An overmanned environment is one with a vast majority of people at the 1-2-3 levels of penetration. An undermanned one has the majority of people at the 4-5-6 penetration levels. Wicker (1968) showed that it was the *experience* of being at the 4-5-6 penetration levels that determined a large amount of the satisfaction and participation of persons, regardless of whether the rest of the environment was overmanned or undermanned.

Leadership. Leadership is a public resource and its availability in an environment can be measured by penetration levels. The elderly of Midwest, for example, have more opportunities for leadership than those of Yoredale, England although the English town had an organization just for elderly (Barker and Barker 1961). The citizens of the public housing environment of ARROWHEAD had fewer opportunities for leadership than citizens in an urban residential area (Bechtel 1972b). The measurement of penetration levels permits an analysis of who leads a community in terms of age, sex, race, and social class. Not surprisingly, Binding (1969) found upper middle class white men of age 45-54 years to be disproportionately represented in leadership roles.

Binding (1969), in his study of leadership in the small community of Midwest, discovered that about 40% of the citizens of the community were leaders of settings (at 5-6 level) and that these persons accounted for 97% of the total leadership in the community.

Diagnosing the availability of leadership roles is a critical factor in improving the self concepts of persons who inhabit an environment (Bechtel 1972b) and in programming work and social activities. The leadership concept is closely tied to undermanning theory in that keeping a high ratio of penetration levels to population defines both an undermanned environment and one with high leadership potential for all citizens.

Crowding. As a consequence of the undermanning data, the definition of an overmanned environment may become a definition for a crowded environment. As Wicker (1973) points out, the undermanning research provides a more profitable course to pursue in defining crowding than either of the common criteria: density, or exhaustion of resources. The undermanning evidence ties the *experiences* of overcrowding phenomena to those of overmanning, thus suggesting that overcrowding can be defined in more precise terms of oversupply of persons available for setting tasks.

This suggests that a reinterpretation of Calhoun's (1964) work is possible. Calhoun is a scientist with the National Institute of Mental Health who studied behavior of rats under conditions that allowed maximum increases in population. He noticed that when the daily behavioral patterns, such as nesting and eating, were disrupted by sheer numbers the behavior routines broke down and the entire population reverted to a behavioral sink. The behavioral sink is defined in terms of behaviors that deviated from normative pursuits in an uncrowded condition (pansexuality, sultanism, etc.). However, if the entire population were described in behavior setting terms, the behavioral sink would occur when the behavior setting boundaries broke down; the behavior of the setting could be explained as either reactions to the breaking down of these barriers, or efforts to re-establish them. Rats that lost their way to the nesting areas or failed to care for their young were simply unable to function without the boundary cues of unobstructed pathways and nesting sites that are required. "Sultan" rats who placed themselves in charge of areas and excluded other rats were attempting to re-establish the boundaries.

Likewise, the density definitions of crowding that seem to fail in cross-cultural comparisons between such crowded areas as Hong Kong and such presumed-to-be crowded areas as Chicago can be seen in light of defining setting boundaries. The tasks of the settings in Hong Kong simply require less space for accomplishment than those of Chicago. Hence, although Chicago is far less dense in ordinary terms, when space required for the settings is used as the criteria there may be considerably more interference.

As Wicker (1973) asserts, there needs to be a great deal more done in terms of: 1) getting more precise measures of degrees of manning in settings, 2) including more laboratory studies, 3) doing more direct observation of setting processes, and 4) examining the long and short-term effects of manning conditions on subsequent experiences. If these conditions can be realized in future research, there is every reason to believe that behavior setting methods can achieve a better definition of crowding.

Environmental regression. Barker and Barker (1961) considered the sum of environmental forces operating on the elderly in two communities and termed it environmental regression. Environmental regression means that there "...is a difference between adulthood and old age of the sort that exists between adulthood and childhood."

In their comparative study of community life in Midwest and in Yoredale, England, the Barkers discovered that the general participation levels of the elderly in community life regress to levels similar to those of adolescents and children. Binding's more recent (1969) study confirms these data for Midwest.

In terms of territorial range (number of settings participated in) and penetration levels, the elderly regressed to about the level of adolescents. In terms of occupancy time and exposure to action patterns, the regression was comparable to preschool age levels. Participation levels of the elderly in Midwest were greater than those of Yoredale because pressures to participate in the smaller Kansas town ($n = 715$) were greater than in the English town ($n = 1300$), consistent with undermanning theory.

Concepts derived from autonomy level measures

The dependent environment. As a consequence of the autonomy behavior scale measured in project ARROWHEAD, Bechtel (1972b) found the residents of this public housing estate to be living in a *dependent environment*. Like the undermanned environment theory, this environmental concept depended on measures independent of the behavior setting survey to flesh out the details of the definition. Pareek was the sociologist who first described dependency behavior in low income environments (1970, p. 306). He states:

Dependency motivation can be characterized in terms of concern for control of decisions in power motivation, and it is expressed through lack of initiative, avoidance syndromes (shifting responsibility to others, exaggerating obstacles), excessive fear of failure, seeking favors of superiors, over-conformity, and aggressive rejection of authority (the so-called reverse reaction to dependency).

The basic data that revealed the dependent environment came out clearly when ARROWHEAD autonomy ratings were compared to those of previous studies (Fig. A1). In terms of the duration (mean hours) of public settings, the residents had 69% of their setting decisions made by the housing authority or a higher governmental level. The nearest comparison was the urban black residential neighborhood with only 40% of their decisions made at a higher level. The behaviors described by Pareek (1970) accompany this kind of environment. The diagnosis is one of overcontrol. The prescription, obviously, is greater autonomy.

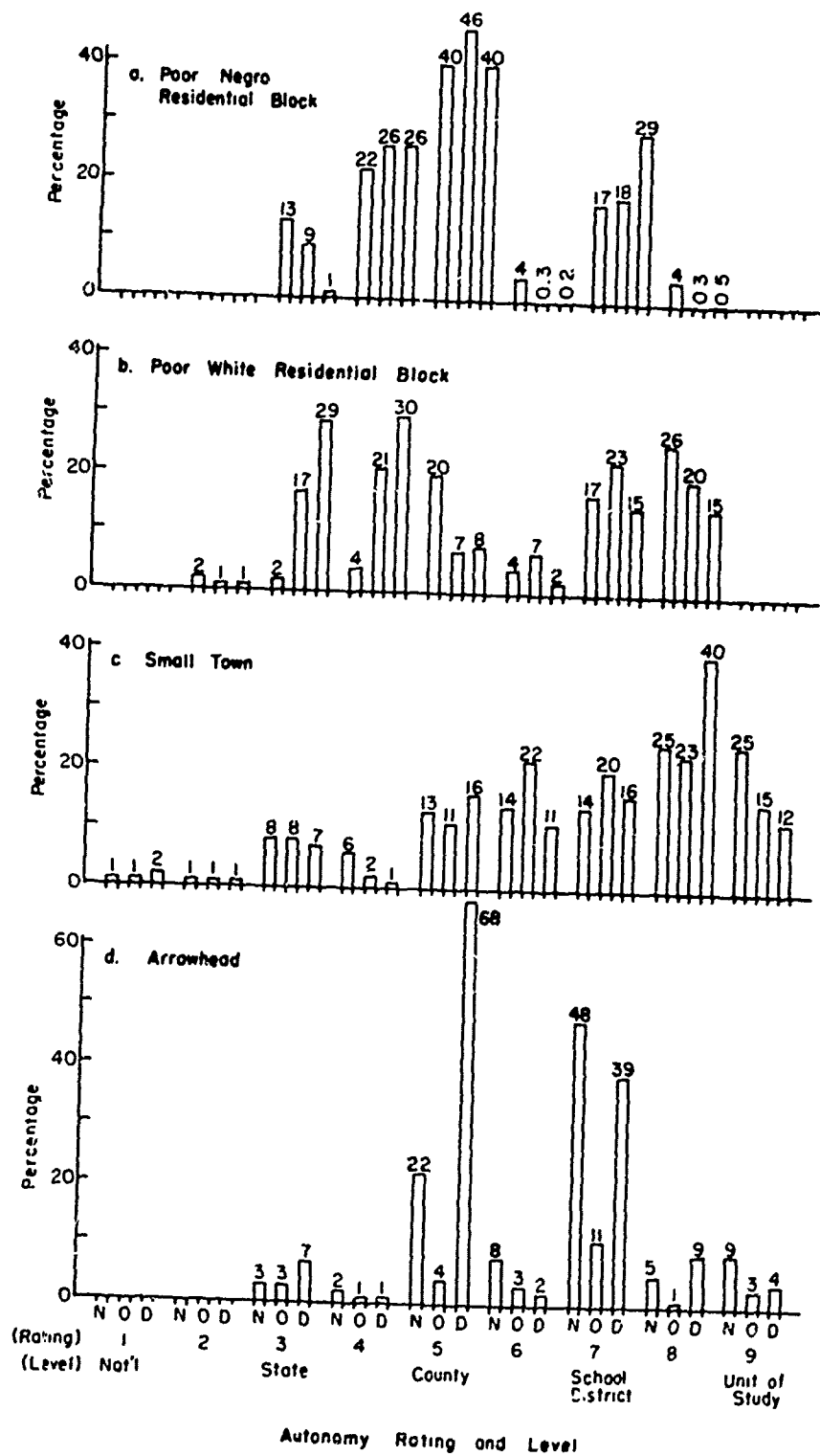


Figure A1. Comparison of autonomy ratings in four environments.

Control and management. The discovery of a dependent environment raised wide-ranging issues in the concept of management itself. How far can, or should, control in management go before it defeats its own purpose? In more searching terms, what is good management? Should it follow the rigid principles of the armed services with little questioning of authority, or should it follow the more democratic policy of allowing maximum choice?

The example of ARROWHEAD is repeated in inner city public housing environments throughout the United States. Such conditions are, no doubt, found elsewhere as well. Perhaps the most critical aspect of producing such an environment is to understand the paternalistic attitude that produced it. Paternalism, as defined by one of the residents of ARROWHEAD, occurs when a person "...can tell you how to lead your life without ever once asking you about it." (Bechtel 1972b). Such an attitude has been a natural one for experts and management to assume when dealing with the poor population. The result, however, is an accumulative encroachment on the decision making processes of residents until a dependent environment is created. Thus, a prescription curing the dependent environment includes a considerable change on the part of management attitudes and practices, as well as changing residents.* Both the local managerial level and the residents have to be given increased autonomy with a mandate to work together.

Perhaps the most serious problem in encouraging residents to regain autonomy is the test of nerves this provides for management, who must tolerate mistakes and who view an increasing burden of attacks and accusations as a sign of progress.

The ultimate solution of how far one goes in developing the residents may be the Bromley-Heath Public Housing Project in Boston where residents have taken over management themselves.†

Richness: The concept of behavior as a resource. A behavior resource is any behavior in the community that is accessible to the individual and in which the individual can participate to some degree. The concept of behavior as a resource is one considered by Barker at the early stages of developing ecological psychology (Barker and Wright 1955). The behavior of a community is a resource to its residents, and the behavior setting survey measures the exposure of all ages, sexes, races, and social classes to the behavioral resources in terms of hours of exposure. Barker and Barker (1964), for example, found that the aged occupy their behavior settings for an average of only 550 hours per year whereas the average occupancy time for the population as a whole is 1,313 hours. Thus, the aged are exposed to less than half of the behavioral resources available to the population as a whole. This kind of measure provides an estimate of relative environmental deprivation for any segment of the population. Thus, there are behavioral resources in the environment of which the elderly in the Barker and Barker (1964) study were not taking advantage.

The concept of variety as behavioral resource

While behavior is a resource in the quantitative sense of exposure time, it is also enriched by being composed of varieties and participation levels. Exposure to two kinds of varieties would not be considered as "rich" an environment as exposure to several more. The definition of richness depends on varieties of behavior and also varieties of people. When one behavior setting is said to be richer than another, it means that the richer one has more varieties of people exposed to more varieties of behavior. The third element, participation level, adds further to the definition, by measuring degree of engagement with the behavior. Thus, the richer a behavior setting, the more varieties of people are exposed to more varieties of behavior at higher participation levels. The formula for general richness reflects these three elements.

*See Bechtel, R.B. (1971) ARROWHEAD, Final Recommendations. Environmental Research and Development Foundation, July 1971, for a complete list of recommendations for eliminating the dependency-paternalism system.

†National Association of Housing and Rehabilitation Officials (1973) *Journal of Housing*, vol. 30, no. 2, p. 80.

While Barker does not calculate the average richness index across all settings, it is often useful to do so. For example, the mean general richness index of Eastside was 5.19, compared to 7.88 for Westside (Bechtel, Achelpohl, and Binding 1971). The mean general richness index for ARROWHEAD was 8.54. This enables the researcher to rank the environments and to gain some notion of the total behavioral resources available in the environment. In less rich environments like Eastside, prescriptions can be made to increase the general richness.

Ecological resource index

Number, occurrence, and duration. Behavior settings might seem to occur at fairly irregular times if one considers the full list of settings in an environment. Less than 3% of the settings in Midwest occur on a daily basis (Barker 1968, p. 106). Likewise, a setting that lasts all day each day has more impact in man hours than one that lasts a few minutes each day. Therefore, to obtain a better view of the importance of settings relative to the total environment, they are reported in terms of number, occurrence, and duration. Number is simply the numerical total of all settings existing in an environment. Occurrence is the number of times a setting is held, ranging from 365 times a year to only once a year. Duration is the total number of hours a setting lasts throughout the year. Barker (1968, p. 107-108) found that number, duration, and occurrences of settings were correlated but that each by itself did not satisfactorily measure the availability of a setting to residents of a community. Since needs of residents are largely satisfied through participation in settings, a better measure was needed to convey the total availability of a setting to the community. Barker combines these three measures into one figure called the *ecological resource index* (ERI).

Calculating the ERI. The ERI index is calculated by use of Kendall's coefficient of concordance W (Siegel 1956, p. 229-238). The number, frequency, and duration of settings are converted to percentages of the totals for all settings (or sets of settings) and these are converted into ranks for calculation of W . Barker asserts that the ERI is the best single estimate of the relative extent of parts of the environment as indicated by number, occurrence, and duration of behavior settings in the parts (Barker 1968, p. 108).

In *East Side, West Side and the Midwest* (Bechtel, Achelpohl, and Binding 1971), the two urban residential blocks are compared on aesthetic action patterns with the ERI index (see Figure A2). It can be seen that ERI indices for aesthetics define a qualitative and quantitative difference between the two. This means that Westside provides a significantly higher ecological resource to its residents on this action pattern than does Eastside.

Welfare: The measurement of age aggregate specific settings in an environment. Barker and Wright (1955) introduced the welfare scale to measure the settings in an environment existing for the welfare of children and adolescents. Figure A3 shows the welfare profiles of three environments. Westside, Eastside, and Midwest (Bechtel, Achelpohl, and Binding 1971). At first the difference between the small town and the city blocks seems striking, but it is probably due to the fact that the city blocks had no school settings.

One of the uses of the welfare rating scale, hitherto not proposed (Bechtel 1973), would be to calculate it for other age groups such as the elderly. With increasing interest in the elderly as a group of national concern (Vash 1972), this measure could be used with considerable amplification of their position as an aggregate in the community.

Physiological-behavior correlates. The behavior mechanisms. Behavior Mechanisms include gross motor activity, manipulative behavior, affective behavior. Thinking and talking are the measures of physiological, anatomical, and expressive levels of participation in an environment. They are another level of activity measure for comparing environments. Penetration levels measure one type of participation and behavior mechanisms measure another. Settings with high ratings on gross motor activity are settings that have higher ratings in physical activity such as running and walking. These mechanisms are also compared with ecological resource indices.

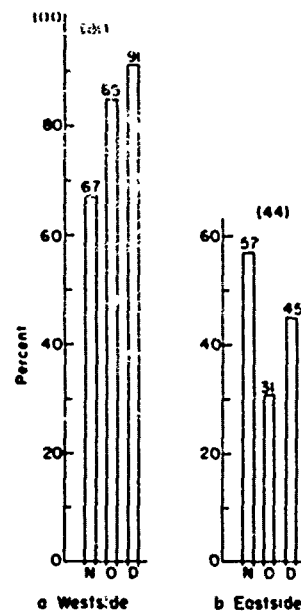


Figure A2. Aesthetics action pattern comparisons between Eastside and Westside using ERI indices (from Bechtel, Achelpohl, and Binding 1971), with percentage totals for number N, occurrence O, and duration D.

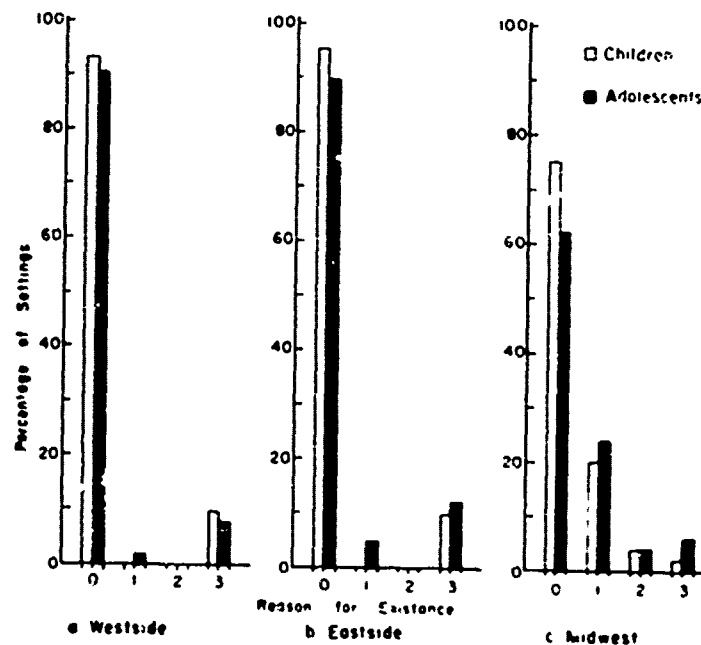


Figure A3. Welfare profiles of behavior settings (from Bechtel, Achelpohl, and Binding 1971, p. 26). Percentages of behavior settings with stated reason for existence with respect to children and adolescents. 0, unconcerned; 1, serves child (adolescent) inhabitants; 2, serves child (adolescent) inhabitants of other settings; 3, children (adolescents) serve other inhabitants.

Figure A4 compares behavior mechanisms across three environments. The largest differences seem to be in the expressive dimension, affective behavior, indicating that Midwest is far less expressive in terms of observable affective behavior than either of the two city blocks at Eastside or Westside. Between these two city blocks, Eastside is less expressive than Westside. Generally, gross motor activity is more vigorous in the two city blocks but there is twice as much thinking (as a prominent feature) in Midwest as in the two city blocks. The city blocks have more observable talking behavior than Midwest.

The behavior mechanism of gross motor activity has great potential use as a physiological activity correlate to such epidemiological variables as vascular disease, obesity, and other variables related to physical activity level.

The problem of incursive and excursive settings. In the earlier studies of Barker and Wright (1955), Barker and Gump (1964), and Barker (1968), the problem of incursive settings was not significant. The reason for this was that the community being studied was rather self-contained. Nearly all of the settings began and ended within the confines of the observable town.

In subsequent studies (Bechtel, Achelpohl, and Binding 1971; Bechtel 1972a, 1972b), the area being studied was arbitrarily chosen as a block or housing project.

The consequences are that many settings enter into the area of study but do not originate there. Many of these settings are those that were included in the small community of Midwest and are part of the larger function of a city. They include settings concerned with police, salesmen, and repair and delivery services. In the urban studies these become the incursive settings and they create a considerable problem in the behavior setting survey.

Incursive settings generally bring strangers, or at least non-residents, into the area being studied on a regular basis. The TV repairman, mailmen, salesmen, police, and other persons performing services enter into the study area as out-of-community or out-of-block performers. As such, although these roles and performance levels are accessible to the population of the city as a whole, they are not nearly as accessible to the resident population being studied as is true in the small town. On a population basis alone,* the opportunities of entering these incursive settings at a performance level are less when the ratio of populations of Kansas City, Missouri, and Midwest (> 500:1) is considered. Consequently, the performance levels of the incursive settings remain generally inaccessible to residents.

Incursive settings also inflate occurrence data in a city relative to the occurrence data in a small town. In Midwest a setting can only occur once a day for a maximum of 365 (or 366) times a year. But incursive settings, such as police, can occur several times a day in the area being studied. In the larger area of a city, of course, such settings also occur only once a day, but since the study area is far smaller, the setting can "leave" and "return" several times a day. One can arbitrarily decide to count this as only one occurrence per day but such a decision fails to account for the observable fact that the setting does "occur" to residents more than once.

In an urban area residents will usually work or live entirely outside the area chosen for study. For children this also means that they go to school outside the area of study. These settings, to which residents go are excursive settings and they create as many problems as the incursive settings. The consequences of excursive settings are reduced occupancy times, vastly decreased action patterns on business, professionalism, education, and other data concerned with work and school.

* The population of Midwest, 750, as compared to the population of Kansas City, Missouri, 504,000

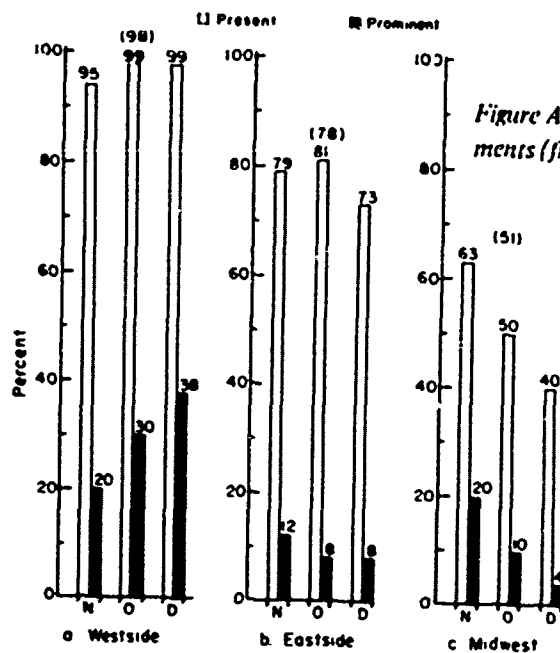


Figure A4. Affective behavior profiles of three environments (from Bechtel, Achelpohl, and Binding 1971).

□ Selling penetration levels in residential area
 ■ Penetration levels of settings available just to residents

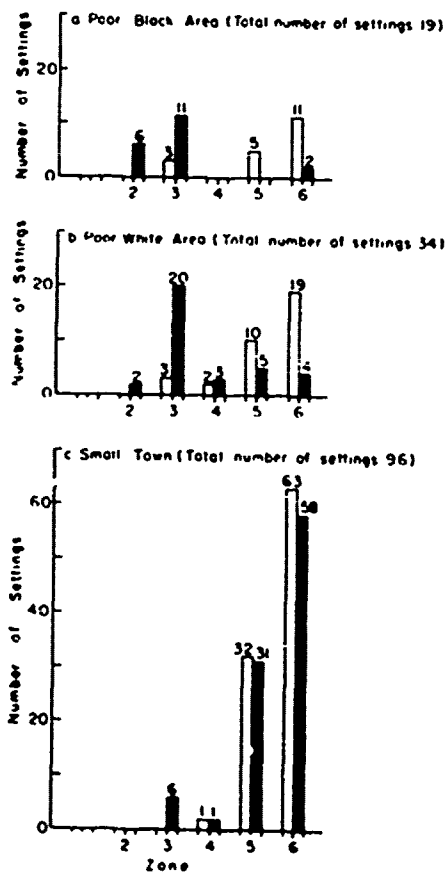


Figure A5. Comparison of maximal penetration levels with penetration levels available to residents in three environments.

One can deal with the distortions of incursive and excursive settings by recalculating Midwest data on a basis of residential areas alone for comparison with urban data (Bechtel 1970). Figure A5 compares Eastside, Westside, and Midwest penetration levels just on a basis of residential areas. This cuts down the number of settings for Midwest from 884 to 96 and provides an acceptable basis on which to compare environments. Relatively speaking, the same problems of incursive and excursive settings occur equally for all three environments compared, when only residential settings are used. It can be seen that the Midwest environment still has a far greater percentage of maximal penetration zones at the 5 or 6 level, but more importantly it can be seen that the *maximum level available to residents* is far higher.

This difference may be entirely due to the fact that the numbers are so large in a city that for all purposes service performance roles in settings are closed to residents. Still another way to look at the difference would be to see it as an effect of undermanning. The total performance levels available to residents in an urban area have to await studies that include all the incursive and excursive settings.

One final problem exists with incursive and excursive settings. How will they be measured? If one considers observation as the necessary method for collecting data, the possibility of observing residents at their individual work settings becomes prohibitive unless only very small groups are studied. Perhaps questionnaires, validated against random observations, will prove feasible. More than likely, the *behavior range* of each resident will have to be obtained by the use of questionnaires in order to include all excursive settings. The behavior range includes all settings the resident enters.

Incursive settings, of course, can be observed along with residential settings.

BEHAVIOR SETTING SURVEY

MASTER FOR SCORING ACTION PATTERN, BEHAVIOR MECHANISM, PRESSURE,
WELFARE AND AUTONOMY RATINGS.

ACTION PATTERN

AESTHETICS

Participation: Does any behavior in this setting make things beautiful
or remove the unsightly?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Are beautifying materials supplied to other settings?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Is there approval or criticism of beautiful things here?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and
Learning:

Is beautification of the environment specifically and
formally taught and learned in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

BUSINESS

- Participation: Does business activity occur in this setting?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Supply: Does this setting supply business materials for another setting?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Evaluation: Is business judged and appraised here?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)
- Teaching and Learning: Are business practices taught and learned in this setting?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)

PROFESSIONALISM

- Participation: Do any of the performers in this setting receive financial recompense?
No - (0)
Yes - percent of OT of all performers
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Supply: Does this setting supply materials for paid work in another setting?
No - (0)
Yes - percent of OT of all performers
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Evaluation: Are paid performers judged in this setting?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)
- Teaching and Learning: Is there specific job training here?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)

EDUCATION

Participation: Does teaching and learning in individual or group lessons take place here?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Does this setting supply materials for teaching or learning in other settings?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Is education overtly appraised in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Is there learning about educational process or method in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

GOVERNMENT

Participation: Is the behavior in this setting controlled by the government in any way?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Does this setting supply materials for governmental activities in other settings?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Are governmental activities openly judged here?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Is there teaching and learning about government, history, law etc. in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

NUTRITION

Participation: Does eating, drinking, preparing, or serving food occur here?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Do people get food or eating utensils to use in another setting?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Do people judge or express appreciation of criticism of food here?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Do people learn and teach ways of preparing and serving food here?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

PERSONAL APPEARANCE

Participation: Do people prepare for this setting by getting especially groomed or attired? Do people get groomed or attired here?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Do people obtain items of adornment or dress in this setting?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Are clothing and grooming appraised here?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Does teaching and learning grooming or dressmaking occur in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

PHILANTHROPY

- Participation: Are voluntary contributions of time, materials or money made to worthy causes in this setting?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Supply: Does this setting provide material or money for philanthropic purposes in other settings?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Evaluation: Is philanthropic activity openly recognized and appraised?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Teaching and Learning: Do people teach and learn about the need and methods of philanthropy?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)

PHYSICAL HEALTH

- Participation: Is physical health promoted in this setting?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Supply: Does this setting supply medical or sports equipment for use in other settings?
No - (0)
Yes - percent of OT
1-20 21-40 41-60 61-80 81-100
(1) (2) (3) (4) (5)
- Evaluation: Is physical health appraised in this setting?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)
- Teaching and Learning: Does formal teaching and learning about health problems occur here?
No - (0)
Yes - percent of OT
1-50 51-100
(1) (2)

RECREATION

Participation: Does this setting provide pleasurable activities for its inhabitants?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Does this setting supply materials for recreation in other settings?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Is appreciation or criticism of recreation openly expressed?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Are people instructed in recreational activities?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

RELIGION

Participation: Are there religious observances in this setting?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Supply: Are materials for worship in another setting provided in this setting?

No - (0)

Yes - percent of OT

1-20	21-40	41-60	61-80	81-100
(1)	(2)	(3)	(4)	(5)

Evaluation: Is religion approved or criticised in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

Teaching and Learning:

Are people instructed in religious forms and values in this setting?

No - (0)

Yes - percent of OT

1-50	51-100
(1)	(2)

SOCIAL CONTACT

Participation: Does interpersonal behavior occur here?

No - (0)

Yes - percent of OT

1-20

21-40

41-60

61-80

81-100

(1)

(2)

(3)

(4)

(5)

Supply:

Does this setting supply the means of social behavior in other settings?

No - (0)

Yes - percent of OT

1-20

21-40

41-60

61-80

81-100

(1)

(2)

(3)

(4)

(5)

Evaluation:

Is there specific approval or disapproval of social behavior in this setting?

No - (0)

Yes - percent of OT

1-50

51-100

(1)

(2)

Teaching and
Learning:

Are social forms and skills taught in this setting?

No - (0)

Yes - percent of OT

1-50

51-100

(1)

(2)

BEHAVIOR MECHANISM

AFFECTIVE BEHAVIOR (EMOTION)

Participation: Does overt emotional expression occur in this setting?

No - (0)

Yes - percent of OT

0-9	10-33	34-66	67-90	91-100
(0)	(1)	(2)	(3)	(4)

Tempo: What is the fastest rate at which affective behavior normally varies in this setting?

(0) - very constant emotional expression, little variation occurs

(1) - about average fluctuations, within middle range of other settings

(2) - variable emotionality, somewhat above middle range of other settings

(3) - frequent, wide swings in affective behavior

Intensity: How intense is the greatest regular emotional expression in this setting?

(0) - apathetic, low intensity of affective behavior

(1) - affectivity within middle range of other settings

(2) - emotional expression high, above middle range of other settings

(3) - intensely emotional behavior occurs

GROSS MOTOR ACTIVITY

Participation: Does large muscle activity occur here?

No - (0)

Yes - percent of OT

0-9	10-33	34-66	67-90	91-100
(0)	(1)	(2)	(3)	(4)

Tempo: What is the top speed at which gross motor activity normally occurs?

(0) - slow movements, below the middle range of other settings

(1) - about average, within the middle range of other settings

(2) - fast actions, above the middle range of other settings

(3) - as fast as is physically possible

Intensity: What is the maximal amount of energy used when the large muscles are active in this setting?

(0) - weak movements, energy below the middle range of other settings

(1) - medium energy expenditure, within the middle range of other settings

(2) - strong movements, energy expenditure above the middle range of other settings

(3) - greatest possible force used

MANIPULATION

Participation: Are the hands used in the behavior pattern of this setting?
No - (0)

Yes - percent of OT

0-9	10-33	34-66	67-91	91-100
(0)	(1)	(2)	(3)	(4)

Tempo: What is normally the top speed of manipulation in this setting?

(0) - slow movements, below the middle range of other settings

(1) - about ordinary, within the middle range of other settings

(2) - fast actions, above the middle range of other settings

(3) - as fast as possible

Intensity: What is the greatest force normally used by the hands in this setting?

(0) - weak, below middle range of other settings

(1) - about average, within middle range of other settings

(2) - strong, above middle range of other settings

(3) - force is at maximum level possible

TALKING

Participation: Do people talk or sing in this setting?

No - (0)

Yes - percent of OT

0-9	10-33	34-66	67-90	91-100
(0)	(1)	(2)	(3)	(4)

Tempo: What is the maximal speed of talking or singing?

(0) - slow utterances, below the middle range of other settings

(1) - average, within the middle range of other settings

(2) - fast verbalization, above the middle range of other settings

(3) - as fast as possible

Intensity: What is the greatest loudness of talking or singing in this setting?

(0) - very low and soft speaking or singing

(1) - average, within the middle range of other settings

(2) - loud verbalization, above the middle range of other settings

(3) - maximal loudness possible

THINKING

Participation: Does problem-solving and decision-making occur here?

No - (0)

Yes - percent of OT

0-9	10-33	34-66	67-90	91-100
(0)	(1)	(2)	(3)	(4)

Tempo:

What is the top speed with which decisions are usually made and problems solved?

- (0) - slow thinking, below the middle range of speedy decisions in other settings
- (1) - average, with the middle range of other settings
- (2) - fast thinking, above the middle range of other settings
- (3) - very fast, lightning-quick decisions

Intensity:

What is the maximal level of problem-solving occurring in this setting?

- (0) - low intellectual level, below the middle range of other settings
- (1) - about average, within the middle range of other settings
- (2) - sharp thinking occurs, above the middle range of other settings
- (3) - really difficult decisions are made and problems solved

PRESSURE

CHILDREN'S occupancy of this setting is:

- (1) required
- (2) urged
- (3) invited
- (4) neither encouraged nor discouraged
- (5) tolerated
- (6) resisted
- (7) prohibited

ADOLESCENT'S occupancy of this setting is:

- (1) required
- (2) urged
- (3) invited
- (4) neither encouraged nor discouraged
- (5) tolerated
- (6) resisted
- (7) prohibited

WELFARE

CHILDREN

- (0) This setting is neutral to the welfare of children; it is neither more nor less devoted to them than to other groups.
- (1) This setting exists primarily for the welfare of its child members; if there were no child members the setting would cease.
- (2) This setting has no child inhabitants (members or performers), but it fosters other settings that are primarily for the welfare of children.
- (3) In this setting child performers serve an adult, adolescent or mixed-age membership. If there were no child performers the setting would close or be severely handicapped.

ADOLESCENT

- (0) This setting is neutral to the welfare of adolescents; it is neither more nor less devoted to them than to other age groups.
- (1) This setting exists primarily for the welfare of its adolescent members; if there were no adolescent members this setting would cease.
- (2) This setting has no adolescent inhabitants (members or performers) but it fosters other settings that are primarily for the welfare of adolescents.
- (3) In this setting adolescent performers serve an adult, child, or mixed-age membership. If there were no adolescent performers the setting would cease or be severely handicapped.

AUTONOMY

What are the sites of the power for carrying out the following functions of this setting, and what is the relative power of each site?

SELECTING THE PERFORMER

- (9) within the base, by base commander, or FAA supervisor
- (7)
- (5) within the county (city)
- (3) within the state, USARAL, FAA Alaska district
- (2) ALCOM, in cases of joint operations
- (1) within the nation, pentagon, FAA Washington

ADMITTING MEMBERS - where are the membership requirements set?

- (9) within the base, by base commander, or FAA supervisor
- (7)
- (5) within the county (city)
- (3) within the state, USARAL, FAA Alaska district
- (2) ALCOM, in cases of joint operations
- (1) within the nation, pentagon, FAA Washington

DETERMINING POLICY - where are plans and programs made?

- (9) within the base, by base commander, or FAA supervisor
- (7)
- (5) within the county (city)
- (3) within the state, USARAL, FAA Alaska district
- (2) ALCOM, in cases of joint operations
- (1) within the nation, pentagon, FAA Washington

ESTABLISHING FINANCIAL ARRANGEMENTS - where are fees and prices set?

- (9) within the base, by base commander, or FAA supervisor
- (7)
- (5) within the county (city)
- (3) within the state, USARAL, FAA Alaska district
- (2) ALCOM, in cases of joint operations
- (1) within the nation, pentagon, FAA Washington

APPENDIX B: SURVEY OF FAMILY HOUSING OCCUPANTS

Fort Wainwright, Alaska, June 1974.

In June 1974, as part of the cold regions habitability project, 51 families were selected at random from the 1,145 cards available at the family housing office. There were actually closer to 1,300 families on base at that time but about 150 were in a transient state, having either just arrived or having cleared quarters to depart. Of the 51 selected at random, 40 (or 78.4%) completed the questionnaire. Reasons for not completing the questionnaire ranged from being on field duty or leave to being under extreme duress, as in one case where a man had shot his wife.

A second set of questionnaires was administered to 27 senior occupants. These, the highest ranking men in a particular housing court, had the responsibility to see that the housing rules were enforced. Since several senior occupants were in each building, the one with the longest period of service at Fort Wainwright was selected from each court to answer the questionnaire.

The questionnaire was constructed to obtain data that would permit rating the house unit on the behavioral scales developed by Roger Barker (1968) and his colleagues. These include such things as the total number of man-hours spent in the housing unit by each family member, the amount of time cleaning, dressing, and tending to the sick, and the time spent on recreation and other activities. Other questions dealt with how the residents adjusted to the climate and what features of the quarters they found satisfactory or in need of change. The questionnaire is contained at the end of this Appendix. From this questionnaire data were collected for recommendations for the renovation and redesign of family housing quarters.

Results - random sample

Social class. The social class of occupants was coded by a system that included GSA ranks. A major or above was considered Class 1, a warrant officer to a captain was considered Class 2, and all enlisted ranks above E4, eligible for housing, were considered Class 3. Those ranks ineligible for housing were considered Class 4. Therefore, no Class 4 persons were in family housing.

The average social class in the family housing sample was 2.7, or close to Class 3. Of the 40 families, there were two Class 1's, and seven Class 2's. The remaining 31 were Class 3. This means a ratio of officers to men of 22.5% to 77.5%, which corresponds fairly well with the ratio for the last week of May 1974 of 23.4% officers to 76.6% men for the total population.

Length of stay. Since behavior setting data are projected over a year's period (in this case from 1 July 1973 through 30 June 1974), the length of stay by days was calculated for each subject. The average length of stay for the year of data collection was 308.8 days, indicating that the average occupant was in his building less than a year. In many cases data were extrapolated for the full 365 days.

In terms of actual time spent at Fort Wainwright, the average occupant had 17.3 months service on site.

Time husband spent in the house. The time spent in the house by the husband was calculated by subtracting all the hours reportedly spent outside the house from the amount calculated on post in 24-hour days. The average husband with an average length of stay on base of only 308.8 days spent 4580.48 hours in the house out of a possible 7411.2 hours. Extrapolated to a 365-day year, these hours would increase to 5,415. This translates into 14 hours, 45 minutes in an average 24-hour period of time spent by husbands in their homes.

Time wife spent in the house. The time that wives spent in the house was calculated by the same method as with husbands. The average wife spent 6,380.5 hours a year inside the house on the 308.8 day basis. This extrapolates to 7541.7 hours on a 365-day basis. Husbands spent 61.8% of all possible time at home while wives spent 86.1% of all possible time at home. Thus husbands spend 24.3% less time at home than wives. This is largely because most wives do not work; 32.5%, however, work at either a part-time or full-time job. On the average, a wife spends 20 hours and 35 minutes in the house during a 24-hour day, or nearly six hours longer than the husband during waking hours.

Time spent in the house by children and adolescents. The figures for children shown in Table B1 vary markedly from those for adults because some of the children were not present during the entire year. The fact that there are so few samples (two in the case of adolescent boys, for example) does not permit drawing any wide-ranging conclusions for these groups.

Table B1: Time spent in the house by children and adolescents.

<i>Infants (under 2)</i>		<i>Preschool (2-5)</i>		<i>Young School (6-8)</i>	
N = 8	N = 6	N = 13	N = 10	N = 5	N = 5
boys	girls	boys	girls	boys	girls
3537	4995	69,004	6211	1745	7423
<i>Old School (9-11)</i>		<i>Adolescents (12-17)</i>			
N = 6	N = 7	N = 2	N = 13		
boys	girls	boys	girls		
6079	4160	6748	6904		

Adult visitors. All respondents reported adult visitors. The average number of man-hours for visiting by adults was 695.9 hours per year. This extrapolates to 822.55 hours for the full year. Hours for adult visitors ranged from 14 to 3,000 for the entire year for the 40 families.

Adolescent and child visitors. Only seven adolescents reported visitors for an average of 330 hours per year. Thirty-two families reported visits by children, ranging from 10 hours to 4,500 per year, with an average of 598 hours for a 308-day year. This extrapolates to 706 hours for a full year. The fact that there are many more child visitors than adolescents indicates a disproportionate use of the home by children, or possibly a disproportionate lack of use by adolescents.

Performance/population ratio. Each setting is divided into performers and nonperformers by Barker (1968). Performers are those in charge of the setting — the leaders. A ratio of leaders to nonperformers in the home measures all children and adults, including visitors. Since each home was judged to have only two leaders (husband and wife) at a 5.0 autonomy rating, the performance/population ratio is really a ratio of parents to children and visitors. The ratio averages about 0.10, or one leader for about ten persons. This is rather low, indicating about ten nonperformers to performers, a large number of children and visitors. The ratios range from a low of 0.03 to a high of 0.25.

General richness index. The homes sampled at Fort Wainwright have a GRI of 25.875 indicating a fairly high richness level compared to other environments.

Self rating of activities. Respondents were asked to rate their number of hours outside the house as compared to their neighbors. Of the 40 families, 21 considered that they were above average compared to their neighbors, 10 considered themselves average, and 8 below average. Thus, 52.5% felt that they were out of the house more than their neighbors.

Hours spent cleaning. Respondents were asked to estimate the amount of time (in hours) each week spent in cleaning the house. The average was 13.17 hours per week and responses ranged from 2 to 28 hours. The 13.17 hours per week (685 hours per year) is only 2.6% of the total occupancy time of 26,373 hours per year (the amount of time all members of the family spend indoors).

Purchases through the mail. Respondents were asked if they purchased any items for the home through the mails, such as from Sears Roebuck, Montgomery Ward, or other mail order companies. Nearly 82.5% replied that they did, and most regarded just looking through the catalogues as a form of recreation. These data contributed to the business activity pattern rating.

Homework. Besides on base schooling, a number of husbands and wives took correspondence courses. A few took courses at the University of Alaska and the adult education center in Fairbanks. About 181.5 hours per year (extrapolated) was the average amount of time spent on homework for all courses. These data were used to rate the percentage of education action pattern for total occupancy time.

Government regulation. Interpretations of what is meant by government regulation varied greatly. Most residents saw it as following the rules for snow removal, cutting the grass, and yearly fire inspections. However, some thought this should include all the time spent watching children outside the house since they felt that they would be reprimanded by M.P.'s if their children were unaccompanied or not supervised. Correspondingly, these respondents reported large amounts of time following government regulations.

The average respondent reported spending 2.49 hours a week following government regulations. These data were used to calculate the percentage of occupancy time in the government action pattern.

Cooking, serving, and eating meals. The average respondent spent 19.58 hours per week in the process of cooking, serving, and eating meals. This is only 3.86% of occupancy time. These data were used to calculate the percentage of total occupancy time for the nutrition action pattern.

Contributions to charity. In addition to contributions made to charities through the husband's Army unit, 82.5% reported making contributions to charities from the home such as to the girl scouts or boy scouts. These data were used to calculate the percentage of total occupancy time for the philanthropy action pattern.

Time to dress. The average respondent reported a time of 40.65 minutes to get the family dressed to go outside in winter. This contrasted to 20.58 minutes reported for summer, or about half as many.

Time spent in recreational activities. Respondents were asked to estimate the amount of time spent in recreational activities per week on an annual basis. The average family claimed to have spent 16.92 hours per week in recreational activity. However, when the families calculated the time spent on their weekly statements about recreational activities, the hours per week were 21.97, or 29.8% more. Thus, there was a tendency to underestimate hours spent in recreation. The tendency may have been larger than these figures indicate because the times spent in activities were themselves estimates.

It seems likely that using specific questions about recreational activities and the time consumed in them would be a better estimate of actual time used than the weekly estimate. These data (the specific activities) were used to rate the recreation action pattern.

Adjustment to climate. Respondents were asked to choose among four ways of describing their adjustment to winter and three ways describing their adjustment to summer. Husbands and wives could differ on their answers.

On adjustments to winter, 11 husbands and wives differed 27.5%. On adjustments to summer, 9 husbands and wives differed 22.5%.

On the four choices for winter adjustment, respondents chose as shown in Table BII.

Table BII. Adjustments to summer and winter.

	<u>No.</u>	<u>Percentage of respondents</u>
Summer		
Try to shut it out	2	2.9
Try to get along with it	22	32.4
Pull down shades to make it dark	14	20.6
Try to stick to a time schedule, despite the hours of sunlight	30	44.1
Total	68	100.0
Winter		
Try to shut it out	5	7.7
Try to go along with it	25	38.5
Try to stick to a time schedule, despite the hours of darkness	35	53.8
Total	65	100.0

Desirable features of Fort Wainwright. Respondents were asked to list the desirable features of Fort Wainwright that they would recommend to a new soldier coming to live at the Fort. They listed the following:

	<u>No.</u>	<u>Percentage of respondents</u>
Outdoor sports	23	57.5
Summers	11	27.5
Alaska scene	10	25.0
Nothing	6	15.0
Small post	5	12.5
Various other items	20	35.0

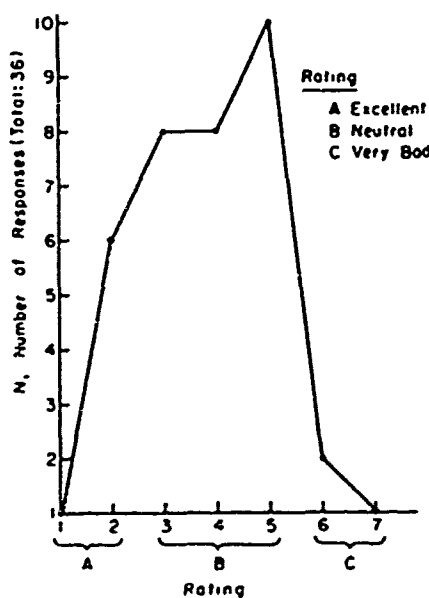


Figure B1. Rating of Fort Wainwright.

Over half mentioned outdoor sports, such as skiing, sledding, and snowmobiling. Nearly a third mentioned the summers and a fourth mentioned something about Alaska. Fifteen percent said there was nothing desirable about Fort Wainwright.

The remainder of items mentioned were scattered over 20 categories, such as wife's job, quiet, lax (informal) post, good pay (this was true for couples without children and working wives), people, and uncrowded conditions (largely for couples without children). It is significant that very few people mentioned anything specific to the Fort itself but concentrated on features of Alaska.

Undesirable features of Fort Wainwright. Respondents were also asked to list the undesirable features of Fort Wainwright:

	<u>No.</u>	<u>Percentage of respondents</u>
Winter cold	19	47.5
PX-commissary	16	40.0
Cost of living	15	37.5
Not enough to do - recreation	11	27.5
Housing	9	22.5
Duty	8	20.0
Other	35	87.5

Similarly as with the more general Alaskan features mentioned as desirable, respondents gave winter cold as the most often mentioned undesirable feature. However, 40% of the respondents mentioned some aspect of the PX or commissary as being undesirable, 27.5% mentioned inadequate recreation. Housing was mentioned as inadequate by 22.5%, 20% said the duty was undesirable, and 87.5% of respondents mentioned other factors spread over a list of 21 items, among which were effects on automobiles of the cold, isolation, facilities in general, neighbors, and the downtown area of Fairbanks.

Rating of Fort Wainwright. Respondents were asked to rate Fort Wainwright on a scale from 1 (excellent) to 7 (very bad). Results show a mean of 3.875, which is slightly to the good side of neutral. Examination of the frequency distribution of responses, however, does not show a normal distribution (see Fig. B1).

From the distribution of scores in Figure B1, it appears as though the scale divided the respondents into two populations, those tending to favor Fort Wainwright, and those not favoring it. These not rating Fort Wainwright well are less extreme than those rating it toward the excellent side. This interpretation is also confirmed by the distribution of scores from the senior occupants.

Services that would improve the post for families. When asked what services could improve the post for families, respondents gave the following items most often:

	<u>No.</u>	<u>Percentage of respondents</u>
Commissary	18	45.0
Recreational facilities	17	42.5
PX	16	40.0
Medical facilities	8	20.0
Swimming pool	8	20.0
Other	26	65.0

Most of the improvements suggested for the commissary had to do with the selection of items and supply of goods, which were felt to be inadequate. Other suggestions centered around the higher prices during pay periods as opposed to the rest of the month, and the inadequate hours, making it difficult for working people to make use of the facility. Similar kinds of suggestions for improvement of the PX were mentioned.

Increasing the capacity of the bowling lanes, changing the hours of operation of the ski resort, and increasing recreation for small children were among the most frequent suggestions for improving recreational facilities. Medical facilities were felt to need improvement in terms of decreasing the waiting time for service. An indoor swimming pool was recommended as an improvement for families living on base.

Generally, the commissary and PX were the two areas of service on the base that needed most improvement.

What would you do to fix up your quarters with \$1000? Respondents were asked what they would do to the quarters if housing gave them \$1000. The most frequent responses are shown in Table BIII. Improving the basement in some fashion was the most frequent response. Most respondents indicated a wish to have it finished; others wanted more electrical outlets or complained about water leaking through the foundation into the basement. The next most frequent response was to paint the interior. The desire for new rugs was next, although rugs were furnished by the post. Windows were a frequent problem since many had lost the insulation seal and frosted up. Others could not be opened for ventilation. Those who did not have dishwashers wanted one. Furniture, pipes, and floors were the last items mentioned. Parents of small children pointed out that the exposed pipes were a hazard to children and two respondents reported burns.

Table BIII. Responses on how to spend \$1000 to improve quarters.

	No.	Percentage of respondents
Improve or finish basement	14	35.0
Paint	13	32.5
Get new rugs	11	27.5
Fix windows	9	22.5
Get a dishwasher	6	15.0
New furniture	5	12.5
Fix pipes	5	12.5
Fix floors	5	12.5
Other (34)		

Sitting and playing in the yard. Most respondents indicated that they sat in the back yard to talk with neighbors (24, or 60%) although 9(22.5%) also indicated the front yard as a place to talk. Since the back yards are oriented toward parking, they are used more for visiting than the front yards. However, for cookouts, the front yard is preferred (17, or 42.5%) over the back yard (7, or 17.5%).

When asked where children played, more (14, or 35%) indicated the front yard, although it was followed by 12 (or 30%) who indicated the back yard. Most parents expressed concern over the children playing in the back among the parked cars. One reported her little girl was seriously injured and the interviewer witnessed a child on a bike strike a car. The hard surface of the parking lot also increases the number of injuries.

Most parents (23 to 12) felt the yard spaces were inadequate and those in favor of fences were 17, against 3 who did not want fences.

The yards seemed to be a focal point of conflicts among neighbors through their children and dogs. Most who wanted fences felt it would help solve the conflicts.

In general, the residents living in the end apartments were the most content with yard space because they had, in effect, three yards, rather than two.

Where do you want to live on post? When asked where they would like to live on post, the most frequent response (19, or 47.5%) was "right here." Other preferred locations were the Air Force quarters (17.5%) and officer duplexes (15%). The large number who were satisfied with their location is probably a reflection of having made a choice among several houses at the time they came to Fort Wainwright.

What needs improvement in your quarters? The basement (42.5%) was the most frequently mentioned item needing improvement. Improvement in the bathroom (37.5%) was the next most frequent response, and this included suggestions for a second bathroom in the basement. Kitchen improvement (35%) was the next most frequently mentioned item. Space in the kitchen was the largest problem. Pipes and radiators and closets (15% each) were the next most frequent items mentioned. The danger of hot pipes for children has already been mentioned, and most wanted the pipes covered. Most closet space was needed by some of the respondents.

What is good about your quarters? The two most frequent responses to this question were the livingroom (25%) and the kitchen (22.5%). 20% replied that they found nothing good about the quarters, 15% thought that the basement was a good idea, and 12.5% liked the bedrooms. The remainder of items were scattered over 16 categories which included the dining room, the bathroom, closets, and having two floors.

Results comparison with senior occupants

Twenty-seven senior occupants were also interviewed and the results of these interviews are generally comparable with the random sample. Table BIV lists a comparison of the two groups on selected variables. In addition, Table BIV compares the results on the questionnaires with the answers given by the habitability project observer (C.B. Ledbetter) who lived in family housing for 11 months. As can be seen from the results, the observer's experiences in working, cleaning, cooking, and dressing were comparable to the random sample and the senior occupants. His rating of Fort Wainwright was much lower, however.

Table BIV. Differences between senior occupants random sample and observer Fort Wainwright housing survey June 1974.

Question	N = 27 Senior	N = 40 Random	N = 1 Observer
Rank	2.85	2.70	2.00
Occurrences (days)	140.37	308.80	298.00
Length of stay (months)	20.81	17.33	11.00
Child visitors (hours)	496.24	598.06	126.00
Adult visitors (hours)	425.93	695.90	320.00
Husband hours	4553.89	4580.48	4548.00
Wife hours	7064.96	5180.50	6195.00
Cleaning hours (per week)	13.15	13.17	14.00
Government regulations (per week)	2.67	2.49	1.00
Cooking (per week)	20.44	19.58	28.00
Dressing (winter)	32.78	40.66	30.00
Dressing (summer)	12.29	20.58	15.00
Rating of Fort Wainwright*	4.06	3.87	6.00

*Scale: 1 (excellent) to 7 (very bad)



DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY ALASKA (FORT WAINWRIGHT)
APO SEATTLE 98731

ARWCO

4 June 1974

SUBJECT: Habitability Study in Cold Regions

Dear Occupant,

The US Army Cold Regions Research and Engineering Laboratory (USACRREL) has a contract with the Environmental Research and Development Foundation (ERDF) to study habitability in cold regions military installations such as Fort Wainwright. During the month of June a representative of ERDF will telephone you to arrange a brief interview with Dr. Bechtel in your home for the purpose of conducting an interview concerning your living quarters.

Your earnest cooperation is desired.

William L. Martin
WILLIAM L. MARTIN
Colonel, Infantry
Deputy Chief of Staff

FORT WAINWRIGHT HOUSING QUESTIONNAIRE
Cold Regions Habitability Project

1. Child visitors per week? Winter _____

Summer _____

How long do they stay? _____

2. On post adult visitors per week? Winter _____

Summer _____

How long do they stay, each visit? _____

3. Off post adult visitors per week? Winter _____

Summer _____

How long do they stay, each visit? _____

4. Hours spent inside the quarters per day?

	Week Day		Saturday		Sunday	
	Winter	Summer	Winter	Summer	Winter	Summer
Mother	_____	_____	_____	_____	_____	_____
Father	_____	_____	_____	_____	_____	_____
Children #1	_____	_____	_____	_____	_____	_____
#2	_____	_____	_____	_____	_____	_____
#3	_____	_____	_____	_____	_____	_____
#4	_____	_____	_____	_____	_____	_____

Do you consider these average for your neighbors?

Yes _____ No _____ Above average _____ Below _____

5. Hours per week at home spent cleaning? _____

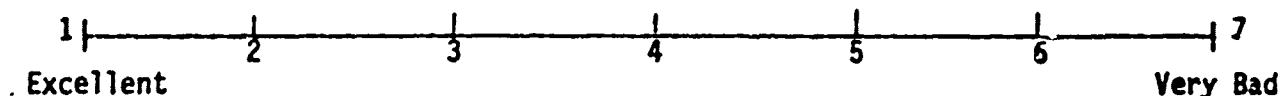
6. Hours per week at home purchasing items, e.g., Sears, Avon, Tupperware? _____
7. Hours per week at home spent doing homework, correspondence courses, etc.? _____
8. Hours per week at home following government regulations? _____
9. Hours per week at home cooking, serving, and eating meals? _____
10. Hours per week contributed to charitable organizations? _____
11. Hours per week dressing and/or preparing to go out? Winter _____
Summer _____
12. Hours per week spent sick, tending to the ill, exercising for health? _____
13. Hours per week spent on recreation? _____
14. Hours per week spent in religious activities, e.g., church, prayers, etc.? _____
15. Do you say prayers at every meal? Yes _____ No _____
Do children say prayers at bedtime? Yes _____ No _____
16. If you have no children, do children visit here? Yes _____ No _____
How often? _____ (wk.) How long do they stay? _____
17. What would you say is the way you adjust to the climate here?
- | | | |
|--------|-------|--|
| Summer | _____ | Try to shut it out |
| | _____ | Try to go along with it |
| | _____ | Pull down shades to make it dark |
| | _____ | Try to stick to a time schedule, despite the hours of sunlight |
| Winter | _____ | Try to shut it out by staying indoors and not looking out of windows |
| | _____ | Try to go along with it |
| | _____ | Try to stick to a time schedule, despite the hours of darkness |

18. If a friend in the service in the 'lower 48' was considering volunteering for duty at Fort Wainwright (or Alaska), what you would advise them is:

A. Desirable about Fort Wainwright

B. Undesirable about Fort Wainwright

19. How would you rate the post for providing for the needs of families; on a scale of 1 (excellent) to 7 (very bad):



20. What services could be provided that would improve the post for families?

21. If family housing were to grant you approximately \$1,000 to be spent on your quarters for any items, what would you request?

22. On the plan, indicate where you:

- A. Sit in the yard talking with neighbors
- B. Cook out
- C. Your children play in the summer
- D. Your children play in the winter

Comment on the adequacy of the above space to satisfy your needs:

23. On the plan, indicate where on post you would prefer to live.

Why?

24. Is there any part of your house that you think needs to be improved?

25. Is there any part of your house that is especially good?

APPENDIX C: SURVEY OF ENLISTED MEN IN BARRACKS

Fort Wainwright, Alaska June 1974

Introduction

As part of the cold regions habitability project, it was decided to obtain information on the living conditions of single enlisted men living in barracks at Fort Wainwright. The questionnaire was constructed to permit rating the barracks rooms on the behavioral scales developed by Roger Barker (1968). The items included questions on the amount of time spent inside and outside the room and a description of activities with time estimates. In addition, questions about improving the physical features of the quarters were asked to determine which aspects were troublesome to the occupants. Data from this questionnaire contributed to recommendations for the renovation and redesign of barracks.

Sampling

During June 1974 a random sample of 624 enlisted men living in barracks was made. The sample included slightly more than 10% (65) of the total enlisted men, and 62 (or 95.4%) of the questionnaires were returned. Of those returned, only 34 (or 54.8%) were complete. The chief source of incompleteness was the series of detailed questions about time in or out of barracks. The remainder of the questions ranged from 76% to 95% in completeness. Most answers are for completed questionnaires only.

Questionnaires (see example at end of this appendix) were handed to each respondent by his sergeant and the returns sent through company channels. Since only 35 completed the detailed time sections of the questionnaire (questions 12 and 13), some caution must be taken in generalizing from these results.

Results

Answers to selected questions were as follows:

No. 2 - Rank. Ranks ranged from Staff Sergeant to PFC, but converting to social class, the average single enlisted man was a Class IV ($x = 3.9$) comprising ranks up to and including E4. There were only five Class III's among enlisted men, in contrast to most of the families who were Class III ($x = 2.7$). Some officers were included in the families, while none were included among the barracks occupants.

No. 4 - Floor of barracks. Eight on first floor, 15 on second floor and 7 on third floor.

No. 6 - Share room with. Twenty-three have a single room, 10 have a semi-private room, and 2 share a room with two persons.

No. 7 - How long have you been at Fort Wainwright? Average stay was 14.6 months; ranging from 8 months to 30 months ($N = 35$). The average single male was at Ft. Wainwright longer than the average family (10.26 months).

Nos. 8, 9 and 10 - Amount of time spent in room. Questions 8, 9 and 10 were used in conjunction with the weekly schedules to estimate the amount of time spent in the room - 4277.75 hours for the year. This is less than the 4580.48 hours spent in the house by married men. The enlisted men also spend an additional 1618.682 hours in the barracks building, making an average

stay of 5895 hours in the barracks building annually. Therefore, if one looks at the barracks and the house as equivalent buildings, then the single enlisted men spend more time indoors in their living quarters. However, if the viewpoint is that only the room is the living quarters, then the single enlisted men spend less time. It may also be the case that the differences between single enlisted and married men are due to the incomplete returns from the single men.

No. 11 Adaptation to summer and winter climates. Responses to the question on adaptation to the summer and winter climates received an 87.7% reply and are probably indicative of the 624 men sampled.

In summer, 52.6% said they tried to go along with the length of the summer day, as opposed to 21.0% who said they tried to pull down shades to make it dark or 26.3% who tried to stick to a time schedule. The largest difference from families is that fewer single men in barracks (26.3%) tried to stick to a time schedule as opposed to families (44.1%). More enlisted men took the attitude of trying "to go along" with the long summer hours (52.6%) as opposed to 32.4% of the families.

There were 54 responses to the winter adaptations (83%). Again, 59.6% said they tried to go along with it (opposed to 38.5% of families) while 11.1% said they tried to shut it out (7% families) and 25.9% said they tried to stick to a time schedule (53.8% of families).

The major difference between the single enlisted men and families is that the single men took a "try to go along with it" attitude while the families tried to stick to a time schedule. The difference may be due to several factors, among them the restrictive time schedules of working wives and children in school.

No. 14 - Hours spent cleaning barracks room. Fifty-one single enlisted men average 6.42 hours a week cleaning while the average family spends 13.17 hours, or more than twice as much. Considering that most housing units have more than twelve times as much space as a barracks room (approx. 100 ft² to 1200 ft²), the amount of time the men spend cleaning the rooms is more than was expected.

No. 15 - Hours spent dressing. Fifty-one single men said that it took them 19.92 minutes to dress in winter as opposed to 9.14 minutes in summer, whereas the families (N = 40) claimed that they took 40.66 minutes for winter and 20.58 minutes for summer - the difference mostly accountable by the presence of children.

No. 16 Correspondence courses. Of the 51 single enlisted men, 22 took correspondence courses of one type or another. Overall 51 men averaged 232.9 hours a year in homework. This is more than the 181.5 hours for families which included homework of children. Thus, a large amount of time is spent in studies by the single enlisted men.

No. 17 Principal activities. When asked which activities, besides sleeping, they spent most of their time doing, the majority of respondents (55.6%) said they spent most of their time reading. The next most frequent response was watching TV (46.3%); 29.7% mentioned listening to radio and/or stereo and 16.7% mentioned writing letters.

No. 18 Activities within barracks area. Activities engaged in within the barracks area were: pool (25.9%), nothing (20.4%), watching TV (18.5%), and working (11.1%). Apparently, there was some diversity in the types of arrangements in the barracks areas. Some had better facilities in the day rooms than others, and the better facilities tended to be used more.

No. 19 Hours sleeping. Hours sleeping for winter averaged 8.13 hours per night for winter and 7.22 hours per night in summer. This agrees with the general report of families that they sleep less in summer.

No. 20 Responses to self-help program. Seventy percent of the single enlisted men reported having done nothing to their rooms through the self-help program. Many noted on their questionnaires that they had never heard of such a thing. Of those who did respond positively, the most popular items (10.5% of responses) were posters. Paint and rugs were the next most popular items. In view of the poor response to the self-help program, there must be some question as to whether it was adequately publicized.

No. 21 - Most desirable aspects of barracks. For the most desirable aspects of the barracks, the most popular response was nothing (29.6%). The next most popular was the private or semi-private room (24.1%), followed by the day room (20.4%) and TV (18.5%). The fact that the highest percentage belongs to a very negative factor (nothing) indicates a generally negative attitude toward the physical aspects of the barracks. The finding of a private or semi-private room being preferred corresponds with other studies (Sellars 1968).

No. 22 - Undesirable aspects of barracks. When asked what features of the barracks were undesirable, there were more responses listed than when the men were asked for most desirable aspects (138 undesirable vs 97 desirable). Also, there were more undesirable categories (49) as opposed to desirable categories (28), indicating that the respondents had a wider range of dislikes than they did preferences. The latrine was named as an undesirable feature by 22.2%, the same number (22.2%) named a general lack of privacy as an undesirable feature, and 16.7% named the day room as an undesirable feature. The remaining responses were divided among many items: 12.9%, for example, felt that the rooms themselves were generally poor and complained about noise.

No. 23 What would be requested for the barracks room. When asked what they would request for the barracks room if they had \$500 to spend on it, 27.8% said carpets or rugs, 22.2% said curtains or drapes, and 20.4% said new or different furniture. 20.4% said they would much prefer enclosing themselves in a private room instead of living in a bay area. This parallels question no. 21, where a preference for private rooms was shown. Actually, 65.7% of the 35 men who completed the questionnaires lived in private rooms. This was possible because of a reduction in forces at Fort Wainwright. Paint or wallpaper was requested by 16.7% of the men to improve their rooms.

No. 24 - Design of new barracks. When asked how they would design a new barracks, 29.6% mentioned the private rooms, 18.5% mentioned a private bathroom, 16.7% mentioned better heating and/or air-conditioning, and 11.9% mentioned that the lockers should be replaced by dressers or bureaus.

In reference to the recreation and laundry rooms, 31.5% said that "equipment that works" must be purchased. The most frequent complaint about the laundry room was that the equipment did not work and/or was not maintained, and 16.7% said that more equipment was needed.

In reference to location of the barracks relative to other facilities, 44.4% said that the present location was satisfactory. Only 16.7% wanted the barracks closer to some facility.

No. 25 - Services to improve the post. When asked what services could be supplied to improve the post, the most popular response (31.5%) was an indoor, heated swimming pool. The next most popular response (20.4%) was to provide more exposure to females of some sort, either to allow visiting in the rooms, more go-go girls at the clubs, or female bartenders.

No. 26 Post activities not used. When asked which post activities they do not use, the most frequent response was "none" (33.3%), indicating that a third of the respondents use all of them. The service club (25.9%) was the activity most frequently mentioned as not being used. Reasons for this were mostly that the persons not using the club did not drink and felt that there was little else to attract them. It appears from these data that some of the needs of the non-drinking single male have been overlooked.

No. 27 - Frostbite. The findings on frostbite are so unusual that they demand special attention. Of 52 single enlisted men answering, 32 (38.5%) responded they had experienced frostbite while at Fort Wainwright. This finding is in extreme contrast to the findings of Doolittle (1972) that 1.5% of the enlisted men experienced frostbite during the 1967-70 period at Fort Wainwright. By Doolittle's findings, 15.5 men out of a thousand experienced frostbite. By these findings, 384.6 men out of a thousand experienced it -- a difference of nearly 25 times.

Corresponding to Doolittle's findings it seems that blacks are more susceptible to frostbite than whites. Of the nine blacks answering this question on the questionnaire, 5 (55.6%) had experienced frostbite compared to 34.1% among whites.

The frostbite question attempted to solicit details on how frostbite occurred and on what parts of the body. Toes and hands were the most prevalent, with ears and parts of the neck also mentioned. There was no general pattern as to how frostbite occurred. Some mentioned getting it while crossing the street. Others mentioned propwash from aircraft.

The main finding from this question is that frostbite, by self-report at least, seems to be far more prevalent than previously reported. This question was asked of the single men because the random sample of family questionnaires uncovered a 5% (2 of 40) rate of frostbite, even though this question was not asked of family members. Thus, if 5% reported frostbite voluntarily, it would seem worthwhile to ask the question of single enlisted men although there was no time to go back and ask the families directly. With a rate this high it would seem that frostbite is almost a common experience -- one that has not been avoided despite the many courses in arctic living and the many precautions about weather conditions (proper clothing, etc.). There are several reasons for this. One of these is the possibility of inadequate clothing (see No. 28 below). Another is the inadequate heating units of Army vehicles. Several respondents attributed this as a direct cause of their frostbite (see No. 29). Perhaps another and more important cause is the human tendency to disregard the necessary precautions. Many times the researchers observed servicemen dashing out into the -30 to -40°F cold to take "short cuts" between buildings rather than take heated corridors or tunnels. There was also an observed tendency not to wear all necessary gear, especially when driving. Whatever the reasons, the incidence of frostbite seems to be far higher than previously imagined and should be dealt with realistically as one of the factors of cold regions life.

No. 28 - Items of clothing not suitable. The most disliked item of clothing was the face mask -- 28.8% mentioned the face mask as inadequate for cold regions conditions. They described it as sticking and freezing to the face. Some claimed that they refused to wear one. The gloves and/or arctic mittens were the next most criticized item (26.9%). The two complaints were. 1) that they simply were not warm enough and 2) that outside they encountered too many conditions where they could not work while wearing the gloves and therefore had to constantly expose their hands to freezing.

Boots (21.1%) were the next item cited for criticism. Many felt they were not warm enough. Others connected the lack of warmth of the boots to the automotive heating equipment and said the boots were not able to keep them warm enough in the poorly heated vehicles (19.2% felt the standard parka was not warm enough).

No. 29 - Adequacy of vehicle heating units. Of the 47 persons answering this question, 34 (72.3%) said they felt that the heating units of Army vehicles were inadequate for the Alaskan cold. The most common complaints were that the units stopped working below a certain temperature or after a period of time, or that once broken they could seldom be fixed. In view of this large response it would seem that the heating units of the vehicles are inadequate as far as the single enlisted men were concerned. This matter was also brought up to the researchers, unsolicited, by the married men and officers.

No. 30 - Aspects of Army life which should be changed. When asked if there was anything about Army life they feel should be changed, there were 30 categories of responses. The most frequent response (23.4%) was the complaint about winter field exercises. Next most frequent (11.5%) was the "no answer" category and this was followed by the suggestion that tours be shorter than the required 18 months (9.6%). No other categories were given by more than 5.7% of the respondents.

Summary

The single enlisted men seemed:

- 1) to be uninformed about the self-help programs
- 2) to have more of an attitude of "going along" with the climate than married couples
- 3) to prefer and like most a single room
- 4) to desire private bathrooms
- 5) to be mainly satisfied with the location of the barracks
- 6) to be fairly susceptible to frostbite
- 7) to spend the majority of their leisure time reading and watching TV
- 8) to generally feel arctic clothing and heaters in Army vehicles are inadequate
- 9) to not like winter field problems.

Single Army women at Fort Wainwright

Along with the 65 single enlisted men randomly sampled at Fort Wainwright, seven single women in the Army answered the same questionnaire. It is not known how representative their responses were of all the Army women at Fort Wainwright.

Since there were so few responses (N = 7), only those answers which seemed markedly different from the men will be noted.

The women averaged more sleep in winter (9.9 hours) than the men (8.13 hours) but less time sleeping in summer (6.35 hours for the women, 7.22 hours for the men).

None of the women had decorated their rooms under the self-help plan.

The most undesirable element was that they were not allowed male visitors in their rooms (42.8%).

The most unused activity by the women (42.8%) was the gym, because the men were constantly using it and it contained no facilities for women.

The women had a 16.7% rate of frostbite (1 out of 6).

Women were not issued thermal underwear or proper gloves because the Army simply did not have them for women.

Several of the women respondents were rather irate at not being treated as adults by the Army command and spoke of being isolated and overprotected.

APPENDIX D: GLOSSARY

Action patterns are eleven kinds of behavior observed and scored in a behavior setting.

Actones are bodily movements that take place within a synomorph. For example the man in the chair will lean forward, sit back, raise his arm, pick up a pencil, put a pencil against paper. These actions are all actones and they can be timed and observed. The study of actones is very similar to time-motion studies, except that TM studies usually deal with more molar units of behavior such as "writing" as opposed to touching a pencil to paper, or "sitting" as opposed to leaning forward or backward in a chair. Thus, TM studies deal more with synomorphic behavior while *kinesic* studies deal with actones.

Behavior mechanisms are five kinds of behavior observed and scored for each behavior setting.

Behavior settings are defined by Barker (1968, pages 18 and 19) as, "one or more standing patterns of behavior" ... with "the milieu circumjacent" ...and... "synomorphic to the behavior." Perhaps the best way to pin down all the aspects of a setting is to look over the seven attributes of the K-21 Scale. (See following pages.) Each behavior setting has these seven attributes and settings are defined relative to other settings by independence scores on these attributes.

But settings are only complicated for researchers. The average person can easily identify settings just by looking at them. Settings are the natural units into which people sort themselves to get the daily business of living done. They are the classrooms, grocery stores, streets and sidewalks, meetings and social events of daily life.

Cytosettings are units of behavior just below the level of a setting. They are divisions of the behavior program. For example, in the behavior setting *Sunday morning worship at the Emmanuel Lutheran Church*, the cytosettings would be processional, scripture readings, hymns, sermon, collection, prayer of the church, and recessional. Not every setting is necessarily divided into cytosettings.

D (duration) is the number of hours in a year that the setting lasted. The maximum is 8760 for a normal year.

Ecological resource index (ERI) is the average of the percents of N, O and D for an action pattern, behavior mechanism or autonomy rating. The ERI is regarded as a measure of how available a particular behavior is in the environment.

Focal point is a term used by Barker and Wright (1955) to indicate the most central behavior setting in a community, organization or building. This is the behavior setting which is more available than any other to the largest variety of different persons and is usually but not necessarily the richest. The focal point for the Barker and Wright (1955) community was a drug store.

General richness index is a measure of the varieties of behavior times number of people times the responsibility levels of the occupants. Richness then is a measure of the desirability of an environment.

Kinesics is a type of observational study originated by Birdwhistell (1970). This type of study really deals with the tiny muscle movements of the body which have social significance and communicate messages. A wink is a unit of behavior of significance to kinesics, so is a roll of the hips, a nervous raising of the hand to the hair or a tendency not to look into the other person's eyes. Kinesics is closely tied with linguistics and is largely concerned with what is communicated by body movement.

K-21 scales. See following pages.

N (number) is merely the number of settings in an environment.

O (occurrence) is the number of days on which a setting occurred. The maximum is 365 for a normal year or 366 for a leap year.

Proxemics is a conceptual framework for studying various distances that surround the body and are defined by the senses. There is a touch zone, a smell zone and a body heat zone. This kind of research was initiated by Edward T. Hall (1966).

Synomorphs are the smaller units of which cytosettings and behavior settings are composed. They are the inseparable links between behavior and environment. A man sitting at his desk is a synomorph. His behavior is inseparable from the desk and chair and both the behavior and the objects form a synomorph. A setting is made up of synomorphs.

The identification of K21 behavior settings (from Barker and Wright 1955)

A behavior setting has been defined as a standing pattern of behavior and a part of the milieu which is synomorphic and circumjacent to the behavior.

The K-Test of interdependency of two behavior settings is based upon ratings of the degree to which:

1. The same people enter both settings
2. The same power figure or leaders are active in both settings
3. Both settings use the same physical space or spaces that are near together
4. Both settings use the same or similar behavior objects
5. The same molar action units span the two settings
6. Both settings occur at the same time or at times that are near together
7. The same kinds of behavior mechanisms occur in the settings.

These criteria of interdependence assume that, in general, the greater the degree to which behavior settings involve the same people, the same place or contiguous places, the same time or contiguous times, the same or similar behavior objects, the same molar actions and similar behavior mechanisms, the greater their interdependence. To estimate the degree of interdependence of a pair of behavior settings, both were judged with respect to each of these criteria on a 7-point scale.

A K-value of 21 was set as the cutting point for differentiating the behavior settings of Midwest. Pairs of unit settings with a K-value of less than 21 were considered as belonging to the same setting and those with a K-value of 21 or greater as belonging to separate settings.

When pairs of behavior settings had K-values below 21, each of these pairs of settings was combined into a single setting:

	K-value
First grade music class vs second grade music class	16
Clifford's drug store fountain vs cigar and candy counter	19
February meeting women's club I vs March meeting women's club I	19
Vacant lot B vs vacant lot C	20

When pairs of behavior settings had K-values greater than 21, each member of these pairs of settings was identified as a separate setting:

	K-value
First grade academic activities vs second grade academic activities	28
County engineer's office vs county registrar of deeds office	28
Presbyterian worship service vs Presbyterian Sunday school exercises	22
Rotary Club regular meeting vs Rotary Club farmer's night	22

The interdependence scale for judging value of K. This scale is for judging the degree of interdependence of any pair of behavior settings A and B. On all criteria, a low rating indicates interdependence, and a high rating indicates independence of setting A and B.

1. *Rating of population interdependence*, i.e. of the degree to which people who enter setting A (P_A) are the same as those who enter setting B (P_B). The percentages' overlap is judged by the following formula:

$$\text{Percentage overlap} = \frac{2P_{AB}}{P_A + P_B}$$

where P_A = number of people who enter setting A

P_B = number of people who enter setting B

P_{AB} = number of people who enter both setting A and setting B.

This percentage overlap is converted to an interdependency rating by the following scale:

<u>Rating</u>	<u>Percentage overlap</u>
1	95 to 100
2	67 to 94
3	33 to 66
4	6 to 32
5	2 to 5
6	trace to 1
7	none

2. *Rating of leadership interdependence*, i.e. the degree to which the leaders of setting A are also the leaders of setting B.

This is judged in the same way as population interdependence for persons who penetrate to zones, 4, 5, or 6 settings A and B.

3. *Rating of spatial interdependence*, i.e. the degree to which settings A and B use the same or proximate spatial areas.

Rating is determined by the following scale. In the case of scale points with two definitions, the most appropriate one applies; if more than one applies, the lowest scale rating is given.

<u>Rating</u>	<u>Percentage of space common to A and B</u>	
1	95 to 100	
2	50 to 94	
3	10 to 49	or A and B use different parts of same room or small area.
4	5 to 9	or A and B use different parts of same building or lot.
5	2 to 4	or A and B use areas in same part of town.*
6	trace to 1	or A and B use areas in same town but different parts of the town.*
7	none	or A in town, B out of town

* Three parts of Midwest were identified: a) south of the square (approximately 15 square blocks), b) area of town square (approximately 5 blocks) c) north of the square (approximately 15 blocks)

4. *Rating of interdependence based on behavior objects, i.e. the extent to which behavior setting A and behavior setting B use identical or similar behavior objects.*

Rate is determined by the following scale. In the case of scale points with two definitions, the most appropriate one applies; if more than one applies, the lowest rating is given.

Rating

1	Identical objects used in setting A and setting B, i.e. all behavior objects shared	
2	More than half of the objects shared by A and B	or virtually all objects in A and B of same kind.*
3	Half of the objects shared by A and B	or more than half of the objects in A and B of same kind.*
4	Less than half the objects shared by A and B	or half the objects in A and B of same kind.*
5	Few behavior objects in A and B identical	or less than half the objects of A and B of same kind.*
6	Almost no objects shared by A and B	or few behavior objects of same kind* in A and B.
7	No objects shared	or almost no similarity between objects in A and B.

5. *Rating of interdependence based on molar action units, i.e. the degree to which molar behavior units are continuous between setting A and setting B.*

The molar behavior in behavior settings A and B may be integrated in two ways. The inhabitants of setting A may interact across the boundary with the inhabitants of B, e.g. the person in the cyto-setting Preacher interacts directly with the members of the cyto-setting Congregation in the Church Service. On the other hand, behavior begun in one behavior setting may be completed in the other, e.g. delivering lumber for a construction project starts at the setting Lumber Yard and is completed at the setting House Construction. Scales are provided for both kinds of behavior integration. For each kind of behavior integration, the highest per cent which applies is used. The average of the two ratings is the final rating.

<u>Rating</u>	<u>Percentage of behavior in A having direct effects in B, or vice versa. (Highest percentage counts.)</u>	<u>Percentage of behavior actions beginning in A which are completed in B, or vice versa. (Highest percentage counts.)</u>
1	95 to 100	95 to 100
2	67 to 94	67 to 94
3	34 to 66	34 to 66
4	5 to 33	5 to 33
5	2 to 4	2 to 4
6	trace to 1	trace to 1
7	none	none

* Objects of the same kind are different instances of objects that have the same dictionary definition, e.g. spoons are used in the behavior setting School Lunch Room and the setting Clifford's Drugstore Fountain, but they are different spoons.

6. *Rating of interdependence based on temporal contiguity*, i.e. the degree to which settings A and B occur at the same time, or at proximate times.

Most behavior settings recur at intervals. Any pair of settings, therefore, may occur close together on some occasions and be temporally separated at other times. For example, the American Legion meets monthly, while the Boy Scout Troop meets weekly; once a month their meetings occur during the same week. The closest temporal proximity of setting A and setting B determine the column to enter the table below. The percent of contact at the point of closest proximity determines the interdependence rating in the column at the right. The percent of contact is computed as the ratio between the number of occurrences of both settings at this closest point of contact divided by the total number of occurrences of both behavior settings.

Interdependence rating	(Closest temporal proximity percentage of contact)					
	Simultaneous	Same part of day	Same day	Same week	Same month	Same year
1	0.75 to 1.00					
2	0.50 to 0.74	0.75 to 1.00				
3	0.25 to 0.49	0.50 to 0.74	0.75 to 1.00			
4	0.05 to 0.24	0.25 to 0.49	0.50 to 0.74	0.75 to 1.00		
5	0 to 0.04	0.05 to 0.24	0.25 to 0.49	0.50 to 0.74	0.75 to 1.00	
6		0 to 0.04	0.05 to 0.24	0.25 to 0.49	0.50 to 0.74	0.50 to 1.00
7			0 to 0.04	0.05 to 0.24	0.25 to 0.49	0 to 0.49

Example: The Boy Scout Troop met every Monday night during the survey year. The American Legion met the first Wednesday of every month. The closest temporal proximity of these settings was Same Week and so the column headed Same Week is entered. The 12 Scout and the 12 Legion meetings which occurred in this close contact were added and the sum divided by the sum of the 12 Legion meetings and the 52 scout meetings, as follows:

$$\frac{12 \text{ Scout meetings}}{52 \text{ Scout meetings}} \quad \frac{12 \text{ Legion meetings}}{12 \text{ Legion meetings}} \quad \frac{24}{64} = 0.37.$$

In column Same Week, 0.37 falls at scale point 6. The temporal interdependence score, then, is 6.

7. *Interdependence based on similarity of behavior mechanisms*, i.e. the degree to which behavior mechanisms are similar in setting A and setting B.

Ratings are based on the following 12 behavior mechanisms:

Gross motor	Writing	Eating
Manipulation	Observing	Reading
Verbalization	Listening	Emoting
Singing	Thinking	Tactual feeling

The interdependence score is determined by the number of behavior mechanisms present in one setting and absent in the other as indicated in the following table:

Interdependence rating	Number of mechanisms present in one setting and absent in the other
1	* 0 to 1
2	2 to 3
3	4 to 5 to 6
4	7 to 8
5	9 to 10
6	11
7	12

The total interdependence score K is the sum of the separate interdependency ratings; the value of K can vary between 7 and 49.